LANTRONIX®

xSenso™

User Guide

- xSenso 2100
- xSenso 21A2
- xSenso 21R2

Part Number 900-629-R
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Revision History

Date	Rev.	Comments
July 2012	A	Initial document for firmware release 7.4.0.0.
March 2013	B	Updated for firmware release 7.6.0.0R10 and added xSenso 21A2 and xSenso 21R2.

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1: Using This Guide

Purpose and Audience

This guide provides the information needed to configure, use, and update the xSenso. It is intended for software developers and system integrators who are installing this product into their designs.

Summary of Chapters

The remaining chapters in this guide include:

Chapter	Description
2: Introduction	Main features of the product and the protocols it supports. Includes technical specifications.
3: Installation of xSenso	Instructions for installing the xSenso 2100.
4: Installation of xSenso 21A2	Instructions for installing the xSenso 21A2.
5: Installation of xSenso 21R2	Instructions for installing the xSenso 21R2.
6: Using DeviceInstaller	Instructions for viewing the current configuration using DeviceInstaller.
7: Configuration Using Web Manager	Instructions for accessing Web Manager and using it to configure settings for the device.
8: Network Settings	Instructions for configuring network settings.
9: Analog Input, Output and Relay Settings	Instructions for configuring analog and relay settings.
10: Chart	Instructions for viewing and configuring live analog chart data on the Chart page.
11: Logging	Instructions for running and configuring live data logs on the Logging page.
12: Reading	Instructions for reading live analog data on the Reading page.
13: Action Settings	Instructions for configuring action for reports and alarms settings.
14: Tunnel and Modbus Settings	Instructions for configuring modbus and tunnel settings.
15: Services Settings	Instructions for configuring DNS, FTP, HTTP and Syslog settings.
16: Security Settings	Instructions for configuring SSL security settings.
17: Maintenance and Diagnostics Settings	Instructions to maintain the , view statistics, files, and diagnose problems.
18: Advanced Settings	Instructions for configuring email, CLI and XML settings.
19: Security in Detail	Provides additional information on security settings available.
20: Updating Firmware	Instructions for obtaining the latest firmware and updating the .
21: Branding the xSenso	Instructions on how to brand your device.
Appendix A: Technical Specifications	Technical specifications for the device.
Appendix B: Technical Support	Instructions for contacting Lantronix Technical Support.

Chapter (continued)	Description
Appendix C: Binary to Hexadecimal Conversions	Instructions for converting binary values to hexadecimals.
Appendix D: Compliance	Lantronix compliance information.
Appendix E: USB-CDC-ACM Device Driver File for Windows Hosts	Information about the device driver file for windows host.

Additional Documentation

Visit the Lantronix Web site at www.lantronix.com/support/documentation for the latest documentation and the following additional documentation.

Document	Description
xSenso Command Reference	Instructions for accessing Command Mode (the command line interface) using a Telnet connection, SSH connection or through the USB port. Detailed information about the commands. Also provides details for XML configuration and status.
xSenso Quick Start Guide	Instructions for getting the xSenso up and running.
DeviceInstaller Online Help	Instructions for using the Lantronix Windows-based utility to locate the xSenso and to view its current settings.

2: Introduction

xSenso is a compact DIN-rail or wall mount solution that enables sensors with analog outputs (voltage or current) to easily and transparently send real-time data to any node on the network or over the Internet. xSenso is an ideal solution for remote monitoring and data logging of critical events in process control and automation applications. With its low port density, xSenso can be affordably installed in dispersed locations. In applications where analog sensors and controllers are used, xSenso can be configured to send alarms via emails or text messages when readings are outside predefined ranges. These alarms allow control engineers to take immediate corrective action when certain thresholds are met. Its embedded web server makes it possible to monitor the input readings, chart or log the data using browsers on computers, smartphones, and tablets from anywhere in the world.

There are three Lantronix xSenso device servers:

- xSenso 2100 with two analog inputs (part number XSO210000-01-S)
- xSenso 21A2 with two analog inputs and two analog output (part number XSO21A200-01-S)
- xSenso 21R2 with two analog inputs and two relay outputs (part number XSO21R200-01-S)

Key Features

- **Power Supply:** 9-30 VDC input voltage (1 terminal screw block and 1 locking barrel jack, where when both are used, may operate as redundancy and failover)
- **Ethernet:** 1 Port Ethernet 10Base-T or 100Base-TX (auto-sensing for speed, duplex and cross-over CAT5 cable)
- **Analog Inputs** (All Models): 2 configurable analog inputs with available ranges: ±100mV, ±1V, ±10V or ±20mA
- **Analog Outputs** (xSenso 21A2): 2 configurable isolated analog outputs with available ranges: 0-10V, 0-20mA
- **Relay Outputs** (xSenso 21R2): 2 independently isolated mechanical form-C relays
- **Wireless:USB Ports:** One 2.0 full speed USB port for device management and configuration
- **Temperature Range:** Storage and operating temperature between -40° to +85°C

Note: *UL-certified operating temperature is -40° to +75°C*

Figure 2-1 Sample xSenso Configuration

Figure 2-1 is an example of how the xSenso can send sensor data (e.g., temperature and humidity readings), over shared networks or the internet to a PC, laptop, or a smart phone. Third party data acquisition applications (e.g., DASYLab, LabVIEW or MATLAB) can also be interfaced with the xSenso to read and log the sensor's data.

Applications

The xSenso device server connects analog sensors such as those listed below to Ethernet networks using the IP protocol family.

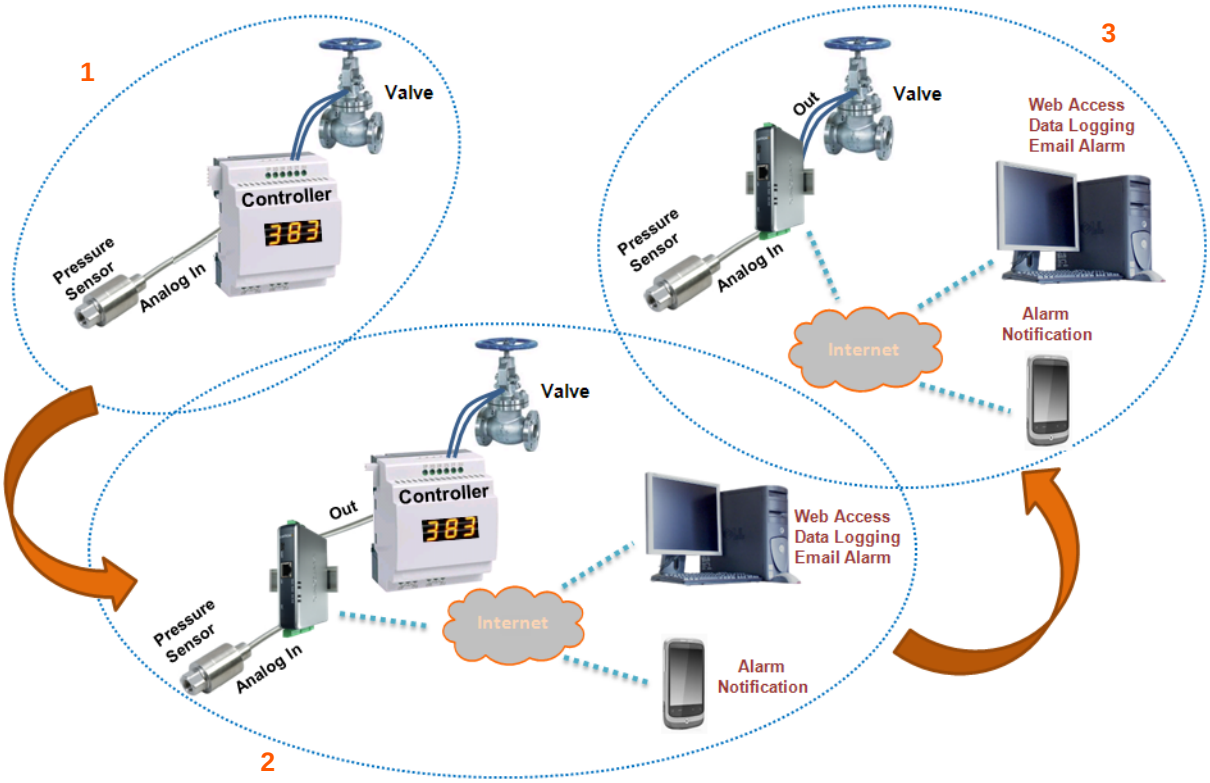
- Temperature Gauge
- Environmental Data Sensors
- Gas Monitoring Devices
- Sensors measuring humidity, pressure, flow, level, force, weight and gas or air quality

Sample Applications

Figure 2-2 below demonstrates three sample xSenso applications:

1. A simple process control example consists of an analog pressure sensor on the input and an analog valve on the output.
2. Using xSenso 21A2 between the sensor and input of the controller would allow users to extract data right over the xSenso ethernet port. In this case, the xSenso can be configured to output the analog signals exactly as receives it on the analog input.
3. The xSenso 21A2 can actually replace the Legacy controller and control the process the exact way it used to be done.

Figure 2-2 Sample Applications



Note: *See Sample Applications on page 16 for an explanation of Figure 2-2.*

Protocol Support

The xSenso device server contains a full-featured IP stack. Supported protocols include:

- ARP, HTTP, HTTPS, SMTP AUTH, SNMP v1/v2c/v3, Modbus TCP, UDP/IP, TCP/IP, SSH, SSL, TLS, RSS, UPnP, ICMP, BOOTP, DHCP, Auto IP, Telnet, SNTP, FTP, FTPS, DNS, TFTP, XML and Syslog for network communications and management.
- TFTP for uploading/downloading files.
- FTP and HTTP/HTTPS web server for firmware upgrades and uploading/downloading files.
- TCP/IP, UDP/IP, Telnet, SSH, SSL, TCP AES and UDP AES for command/response based data acquisition application or alarm triggered connection
- HTTP/HTTPS web based monitoring of input readings, chart and data logging
- SMTP AUTH, HTTP/HTTPS Post, FTP/FTPS Put and SNMP Traps for alarm triggered notification
- SNTP for device clock synchronization

Troubleshooting Capabilities

The xSenso offers a comprehensive diagnostic toolset that lets you troubleshoot problems quickly and easily. Available from the CLI or Web Manager, the diagnostic tools let you:

- View memory and IP socket information.
- Perform ping and traceroute operations.
- Conduct forward or reverse DNS lookup operations.
- View all processes currently running on the xSenso, including CPU utilization.
- View system log messages.

Configuration Methods

After installation, the xSenso requires configuration. For the unit to operate correctly on a network, it must have a unique IP address on the network. There are four basic methods for logging into the xSenso and assigning IP addresses and other configurable settings:

- **Web Manager**: View and configure all settings easily through a web browser using the Lantronix Web Manager. (*See "Configuration Using Web Manager" on page 42.*)
- **DeviceInstaller**: Configure the IP address and related settings and view current settings on the xSenso using a Graphical User Interface (GUI) on a PC attached to a network. You will need the latest version of DeviceInstaller. (*See "Using DeviceInstaller" on page 40.*)
- **Command Mode:** There are two methods for accessing Command Mode (CLI): making a Telnet or SSH connection, or connecting a PC or other host running a terminal emulation program to the unit's USB port. (See *Configuration Using the MGMT (USB) Port* below and the *xSenso Command Reference Guide* for instructions and available commands.)
- **XML:** The xSenso supports XML-based configuration and setup records that make device configuration transparent to users and administrators. XML is easily editable with a standard text or XML editor. (See the *xSenso Command Reference Guide* for instructions and commands.)

Configuration Using the MGMT (USB) Port

In order to configure and manage the device, connect the computer via USB cable to the xSenso MGMT port and run a terminal emulation program (e.g., Tera Term).

Note: *Device connection will be lost upon reboot. Close the connection (also close emulation program terminal if needed), unplug and plug in the USB port, and reopen the connection.*

1. Install the USB device driver, as necessary.

   Connection to the MGMT port is via USB-CDC-ACM. This driver is available in Windows. In order to enable Windows to recognize the USB-CDC-ACM connection to the Lantronix device, the driver installation file referenced below needs to be provided when prompted by the Windows Device Driver Installation Wizard. For Windows 7 installation, it is recommended to manually install the driver before plugging in the USB cable to the xSenso device port. This can be done by installing a legacy driver for a COM port, with the Have Disk... option.

   The device installation file (linux-cdc-acm.inf) may be accessed in one of two ways:

a. DeviceInstaller installation directory (typically at c:\Program File\Lantronix\Device Installer\4.3).

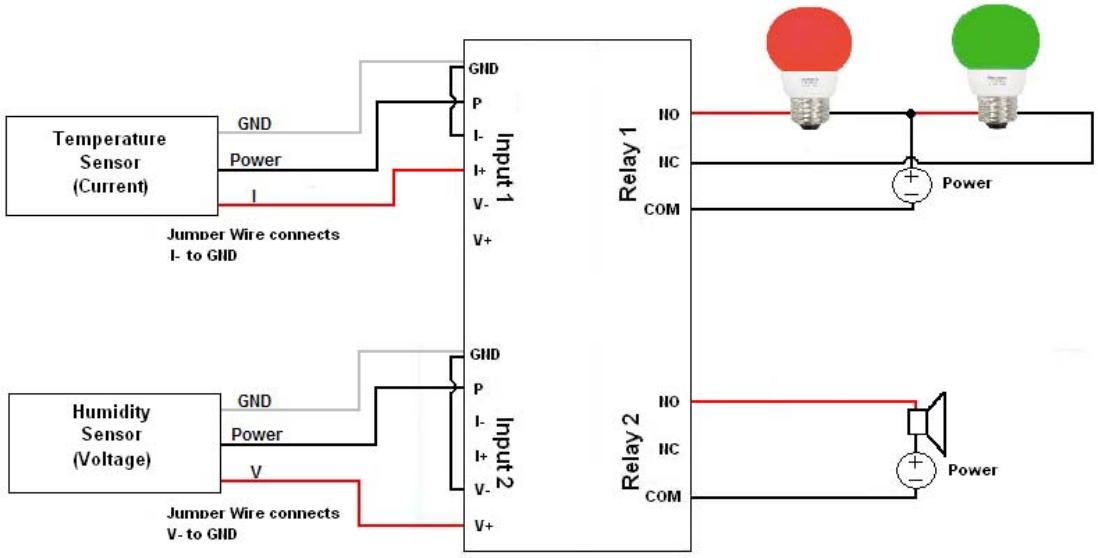
b. Follow the instructions in *Appendix E: USB-CDC-ACM Device Driver File for Windows Hosts* to create the .inf file and follow the windows driver installation steps as outlined above.

2. Connect the USB cable to the MGMT (USB) port of the xSenso device.
3. Connect the USB cable from the xSenso to the USB port on your computer.
4. Apply power. If drivers are installed, a virtual com port will be created on the computer.
5. Launch an emulation program terminal (e.g., Tera Term) and select the virtual com port.
6. Open up the virtual com port. The serial setting should be **9600**, **8**, **none**, and **1**.
7. Click **OK**.
8. Press **Enter** in the terminal window. You will be prompted to login.
9. Login to the xSenso to configure it. The default login and password:
   - User Name: **admin**
   - Password: **PASS**

xSenso Wiring Example

In *Figure 2-3* below, there are two sensors connected to the inputs of the xSenso. One is the temperature sensor and the other is the humidity sensor. In this example, Relay 1 is associated with the temperature sensor and Relay 2 with the humidity sensor. In Relay 1, the Normally Open (NO) pin allows the green light to stay on under normal operations. Once the Normally Closed (NC) pin is activated, the green light will be turned off and the red light will be turned on indicating an alarm condition. The threshhold ranges can be defined within the xSenso web interface. In Relay 2, a buzzer is connected to Normally Open (NO) pin and once the alarm condition is met, the relay will be closed and the buzzer will sound.

Figure 2-3 xSenso Wiring Diagram



Addresses and Port Numbers

Hardware Address

The hardware address is also referred to as the Ethernet address, physical address, or MAC address. Sample hardware address:

- `00---14-1B-18`
- `00:::14:1B:18`

IP Address

Every device connected to an IP network must have a unique IP address. This address references the specific unit.

Port Numbers

Every TCP connection and every UDP datagram is defined by a destination and source IP address, and a destination and source port number. For example, a Telnet server commonly uses TCP port number 23.

The following is a list of the default server port numbers running on the xSenso:

- TCP Port 22: SSH Server (Command Mode configuration)
- TCP Port 23: Telnet Server (Command Mode configuration)
- TCP Port 80: HTTP (Web Manager configuration)
- TCP Port 21: FTP
- UDP Port 30718: LDP (Lantronix Discovery Protocol) port
- TCP/UDP Port 10001: Tunnel 1 (see note below)
- UDP Port 1900 and TCP Port 30179: UPnP

Note: *Additional TCP/UDP ports and tunnels will be available, depending on the product type. The default numbering of each additional TCP/UDP port and corresponding tunnel will increase sequentially (i.e., TCP/UDP Port 1000X: Tunnel X).*

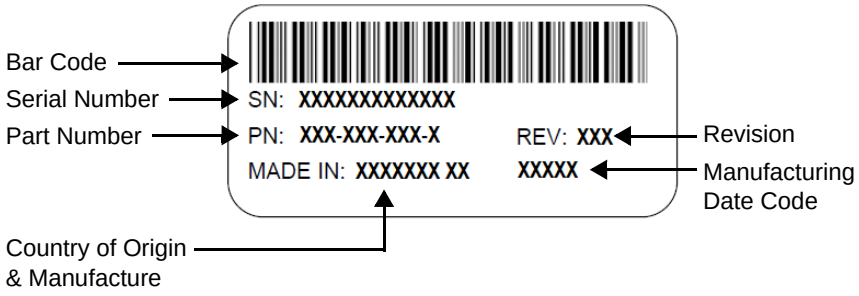
Product Information Label

The product information label on the unit contains the following information about the specific unit:

- Bar code
- Product Revision
- Part Number
- Serial Number (MAC Address)
- Manufacturing Date Code

Note: *The hardware address on the label is also the product serial number. The hardware address on the label is the address for the Ethernet (eth0) interface.*

Figure 2-4 xSenso Product Label



3: Installation of xSenso

This chapter describes how to install the xSenso analog device server. It contains the following sections:

Package Contents

The xSenso package includes the following items:

- One xSenso 2100 device
- One 3-contact terminal block plug (screw type for power input port)
- Two 6-contact terminal block plug (screw type for analog input ports)
- Wall Mount Bracket
- Four Rubber Feet
- Quick Start Guide

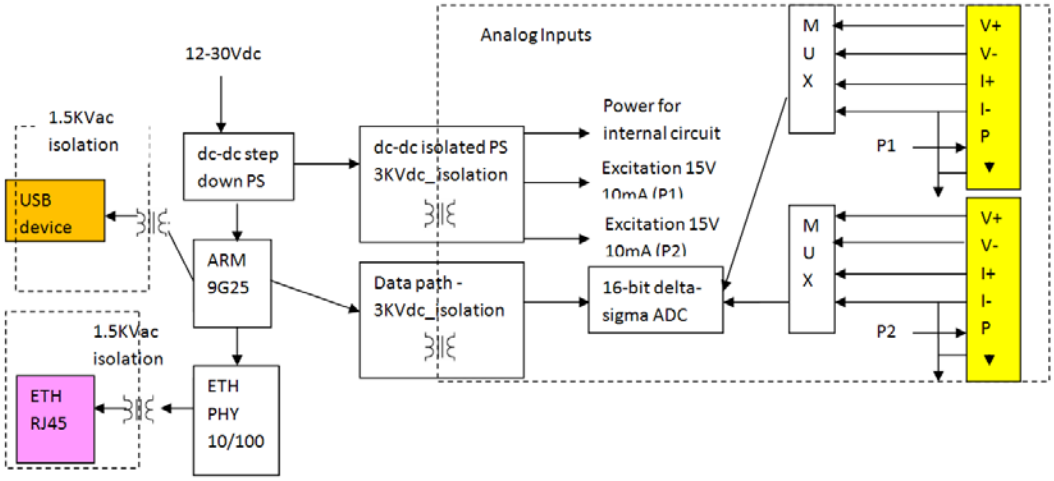
User-Supplied Items

To complete your installation, you need the following items:

- Analog devices and sensors that require network connectivity.
- An available connection to your Ethernet network and an Ethernet cable.
- A working AC power outlet if the unit will be powered from an AC power adapter.
- A 9-30VDC power supply either terminal screw or barrel input (both may be used simultaneously for power redundancy)

xSenso 2100 Isolation Block Diagram

Figure 3-1 xSenso 2100 Isolation Block Diagram



Hardware Components

Front/Top Panel

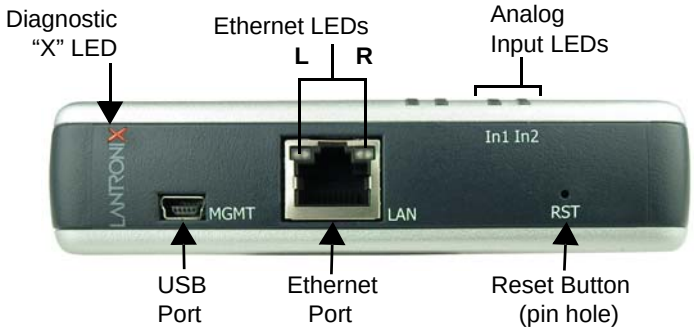
The following components are located on the front panel (*Figure 3-2*) of the xSenso :

- **USB Port** - for managing and configuring xSenso device.
- **RJ-45 Ethernet Port** (with Ethernet LEDs) - can connect to an Ethernet (10 Mbps) or Fast Ethernet (100 Mbps) network.
- **RST Button** (the *Reset Button* inside the pin hole) - power cycles and restores factory default settings.
- **LED Indicators (2 Analog Input LEDs, 2 Ethernet LEDs, and 1 Diagnostic "X" LED)** - see *Table 3-4* and *Table 3-5*.

LED Indicators

The Analog Input LEDs, the Ethernet LEDs, and the Diagnostic "X" LED are all located on the front panel of the xSenso device (*Figure 3-2*).

Figure 3-2 xSenso , Front View



Note: *Though there appear to be four analog input LEDs located on the front panel, only the two right Input LEDs are supported in xSenso .*

Figure 3-3 xSenso Top/Front View

Table 3-4 and *Table 3-5* below explain the LED information displayed in *Figure 3-2* and *Figure 3-3* above.

Table 3-4 Analog Input LEDs

LED	Color	ON	OFF
"X" on top of xSenso device (Diagnostic)	**Orange**	**ORANGE ON** - power present **ORANGE Blink** - during boot process after power cycle or reset. Also blink patterns represent error conditions: ◆ **Loss of Redundant Power**: one slow blink followed by two fast blinks (repeat) ◆ **No Ethernet Link**: two slow blinks followed by two fast blinks (repeat) ◆ **No IP Address**: three slow blinks followed by three fast blinks (repeat)	No power
Analog Input 1	**Green or Orange**	Input Type (voltage or current) ◆ **GREEN** represents 100mV, 1V or 10V input range is selected ◆ **ORANGE** represents 20mA input range is selected	Input not utilized
Analog Input 2	**Green or Orange**	Input Type (voltage or current) ◆ **GREEN** represents 100mV, 1V or 10V input range is selected ◆ **ORANGE** represents 20mA input range is selected	Input not utilized

Table 3-5 Ethernet LEDs

Ethernet LEDs	Description
Left (L)	**GREEN ON** - 100 Mbps link established **GREEN Blink** - 100Mbps activity **AMBER ON** - 10 Mbps link established **AMBER Blink** - 10 Mbps activity
Right (R)	**GREEN ON** - Full duplex **OFF** - Half duplex

Reset Button

You can reset the xSenso to factory default settings, including clearing the network settings. The IP address, gateway, and netmask are set to 00s.

To reset the unit to factory defaults:

1. Place the end of a paper clip or similar object into the **RST** (reset) opening (see *Figure 3-2*) and press and hold down micro switch during a power cycle for a minimum of 25 seconds.
2. Remove the paper clip to release the button. The unit will continue the boot process restoring it back to the original factory default settings.

To reboot the unit without resetting the unit to factory defaults:

1. Place the end of a paper clip or similar object into the **RST** (reset) opening (see *Figure 3-2*) and press and hold down micro switch during a power cycle for 3 to 5 seconds.
2. Remove the paper clip to release the button. The unit will reboot.

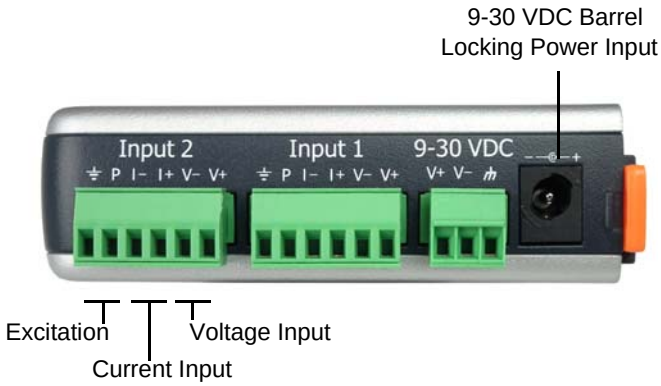
Right Side Panel

The following are located on the right side panel (*Figure 3-6*):

- Analog Input 1
- Analog Input 2
- 9-30 VDC 3 Pin Terminal Block Power Input
- 9-30 VDC Barrel Locking Power Input

Note: *There are no inputs or outputs on the left side panel.*

Figure 3-6 xSenso, Side View



Back Panel

On the xSenso back panel, there is a mounting bracket with a sliding orange clip which allows you to mount and dismount the device from a DIN rail, as shown in *Figure 3-3*. There are also four rubber feet that can be attached to the bottom-side of the device, if the xSenso is to be placed on a flat surface.

Figure 3-7 xSenso Bottom/Back Panel View

Installing the xSenso

Be sure to place or mount the device securely on a flat horizontal or vertical surface. The device comes with mounting brackets for mounting the device vertically, for example on a wall. If using AC power, avoid outlets controlled by a wall switch.

Observe the following guidelines when connecting the analog input devices:

- It is recommended to use twisted-pair wires to connect analog sensors and xSenso. If EMC is a concern, shielded wires and/or ferrite bead may be used to improve signal integrity in noisy environment.

- Connect your RJ-45 Ethernet cable to the RJ-45 port of the unit.
- The xSenso supports a power range of 9 to 30 VDC. You can power up the device with barrel-power connector and/or the 3 pin terminal connector for backup power supply.

Note: *As soon as you plug the device into power, the device*/sensors *powers up automatically, the self-test begins, and LEDs would indicate the device's status*

Perform the following steps to install your device:

1. Connect analog xSenso to the analog input ports.
2. Hook up power excitations from xSenso to analog sensors/devices if needed and if xSenso meets the power requirement.
3. Connect a RJ-45 Ethernet cable between the unit and your Ethernet network.
4. Connect the 9-30 VDC to the terminal block, barrel jack or both, and power on the xSenso.
5. Power up analog input devices/sensors if they are not powered by xSenso excitation.

4: Installation of xSenso 21A2

This chapter describes how to install the xSenso 21A2 device server. It contains the following sections:

Package Contents

The xSenso package includes the following items:

- One xSenso 21A2 device
- Three 3-contact Terminal Block Plug - screw type for Power Input Port and Analog Output Ports.
- Two 6-contact Terminal Block Plug - screw type for Analog Input Ports
- Wall Mount Bracket
- Four Rubber Feet
- Quick Start Guide

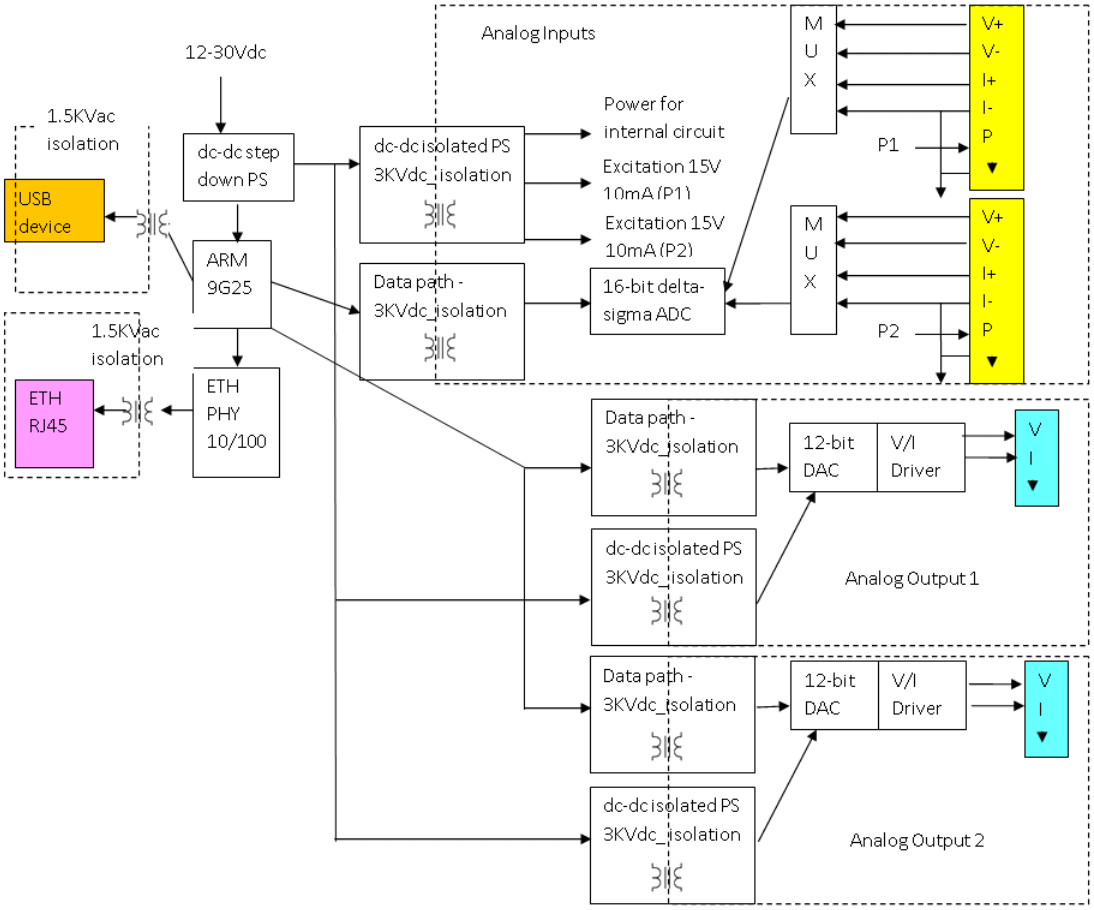
User-Supplied Items

To complete your installation, you need the following items:

- Analog devices and sensors that require network connectivity.
- Devices to be controlled by analog output.
- An available connection to your Ethernet network and an Ethernet cable.
- A working AC power outlet if the unit will be powered from an AC power adapter.
- A 9-30VDC power supply either terminal screw or barrel input (both may be used simultaneously for power redundancy)

xSenso 21A2 Isolation Block Diagram

Figure 4-1 xSenso 21A2 Isolation Block Diagram



Hardware Components

Front/Top Panel

The following components are located on the front panel (*Figure 4-2*) of the xSenso 21A2:

- **USB Port** - for managing and configuring xSenso device.
- **RJ-45 Ethernet Port** (with Ethernet LEDs) - can connect to an Ethernet (10 Mbps) or Fast Ethernet (100 Mbps) network.
- **RST Button** (the *Reset Button* inside the pin hole) - power cycles and restores factory default settings.
- **LED Indicators** (4 Analog Input/Output LEDs, 2 Ethernet LEDs, and 1 Diagnostic “X” LED) - see *Table 4-4* and *Table 4-5*.

LED Indicators

The Analog Input LEDs, the Analog Output LEDs, the Ethernet LEDs, and the Diagnostic "X" LED are all located on the front panel of the xSenso device (*Figure 4-3*).

Figure 4-2 xSenso 21A2, Front View

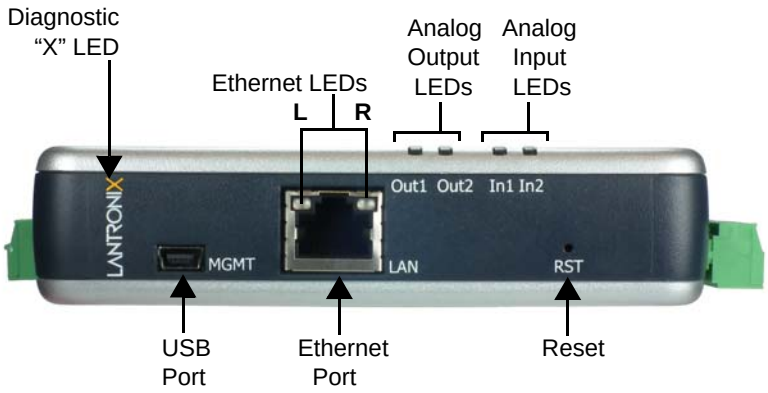


Figure 4-3 xSenso 21A2 Top/Front View

Table 4-4 and *Table 4-5* below explain the LED information displayed in *Figure 4-2* and *Figure 4-3* above.

Table 4-4 Analog Input and Analog Output LEDs

LED	Color	ON	OFF
"X" on top of xSenso device (Diagnostic)	**Orange**	**ORANGE ON** - power present **ORANGE Blink** - during boot process after power cycle or reset. Also blink patterns represent error conditions: ◆ **Loss of Redundant Power**: one slow blink followed by two fast blinks (repeat) ◆ **No Ethernet Link**: two slow blinks followed by two fast blinks (repeat) ◆ **No IP Address**: three slow blinks followed by three fast blinks (repeat)	No power
Analog Input 1	**Green or Orange**	Input Type (voltage or current) ◆ **GREEN** represents 100mV, 1V or 10V input range is selected ◆ **ORANGE** represents 20mA input range is selected	Input not utilized
Analog Input 2	**Green or Orange**	Input Type (voltage or current) ◆ **GREEN** represents 100mV, 1V or 10V input range is selected ◆ **ORANGE** represents 20mA input range is selected	Input not utilized
Analog Output 1	**Green or Orange**	Output Type (voltage or current) ◆ **GREEN** represents 0-10V output range is selected ◆ **ORANGE** represents 20mA output range is selected	Output not utlized.
Analog Output 2	**Green or Orange**	Output Type (voltage or current) ◆ **GREEN** represents 0-10V output range is selected ◆ **ORANGE** represents 20mA output range is selected	Output not utlized.

Table 4-5 Ethernet LEDs

Ethernet LEDs	Description
Left (L)	**GREEN ON** - 100 Mbps link established **GREEN Blink** - 100Mbps activity **AMBER ON** - 10 Mbps link established **AMBER Blink** - 10 Mbps activity
Right (R)	**GREEN ON** - Full duplex **OFF** - Half duplex

Reset Button

You can reset the xSenso to factory default settings, including clearing the network settings. The IP address, gateway, and netmask are set to 00s.

To reset the unit to factory defaults:

1. Place the end of a paper clip or similar object into the **RST** (reset) opening (see *Figure 4-2*) and press and hold down micro switch during a power cycle for a minimum of 25 seconds.
2. Remove the paper clip to release the button. The unit will continue the boot process restoring it back to the original factory default settings.

To reboot the unit without resetting the unit to factory defaults:

1. Place the end of a paper clip or similar object into the **RST** (reset) opening (see *Figure 4-2*) and press and hold down micro switch during a power cycle for 3 to 5 seconds.
2. Remove the paper clip to release the button. The unit will reboot.

Side Panels

The following are located on the side panels (*Figure 4-6*):

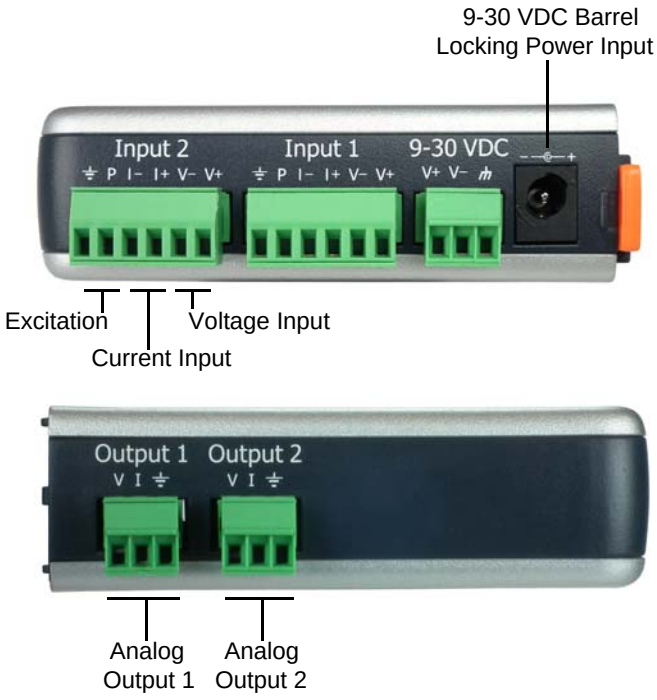
Right Side

- Analog Input 1
- Analog Input 2
- 9-30 VDC 3 Pin Terminal Block Power Input
- 9-30 VDC Barrel Locking Power Input

Left Side

- Analog Output 1
- Analog Output 2

Figure 4-6 xSenso, Side Views



Back Panel

On the xSenso back panel, there is a mounting bracket with a sliding orange clip which allows you to mount and dismount the device from a DIN rail, as shown in *Figure 4-7*. There are also four rubber feet that can be attached to the bottom-side of the device, if the xSenso is to be placed on a flat surface.

Figure 4-7 xSenso Bottom/Back Panel View

Installing the xSenso

Be sure to place or mount the device securely on a flat horizontal or vertical surface. The device comes with mounting brackets for mounting the device vertically, for example on a wall. If using AC power, avoid outlets controlled by a wall switch.

Observe the following guidelines when connecting the analog input and output devices:

- It is recommended to use twisted-pair wires to connect analog sensors and xSenso. If EMC is a concern, shielded wires and/or ferrite bead may be used to improve signal integrity in noisy environment.
- Connect your RJ-45 Ethernet cable to the RJ-45 port of the unit.
- The xSenso supports a power range of 9 to 30 VDC. You can power up the device with barrel-power connector and/or the 3 pin terminal connector for backup power supply.

Note: *As soon as you plug the device into power, the device/sensors powers up automatically, the self-test begins, and LEDs would indicate the device's status*

Perform the following steps to install your device:

1. Connect analog devices to the analog input and output ports.
2. Hook up power excitations from xSenso to analog sensors/devices if needed and if xSenso meets the power requirement.
3. Connect a RJ-45 Ethernet cable between the unit and your Ethernet network.
4. Plug the xSenso into the power outlet by using the included power supply.
5. Power up analog input devices/sensors if they are not powered by xSenso excitation.
6. Power up devices to be controlled by analog output.

5: Installation of xSenso 21R2

This chapter describes how to install the xSenso 21R2 device server. It contains the following sections:

Package Contents

The xSenso package includes the following items:

- One xSenso 21R2 device
- Three 3-contact Terminal Block Plug - screw type for Power Input Port and Relay Output Ports
- Two 6-contact Terminal Block Plug - screw type for Analog Input Ports
- Wall Mount Bracket
- Four Rubber Feet
- Quick Start Guide

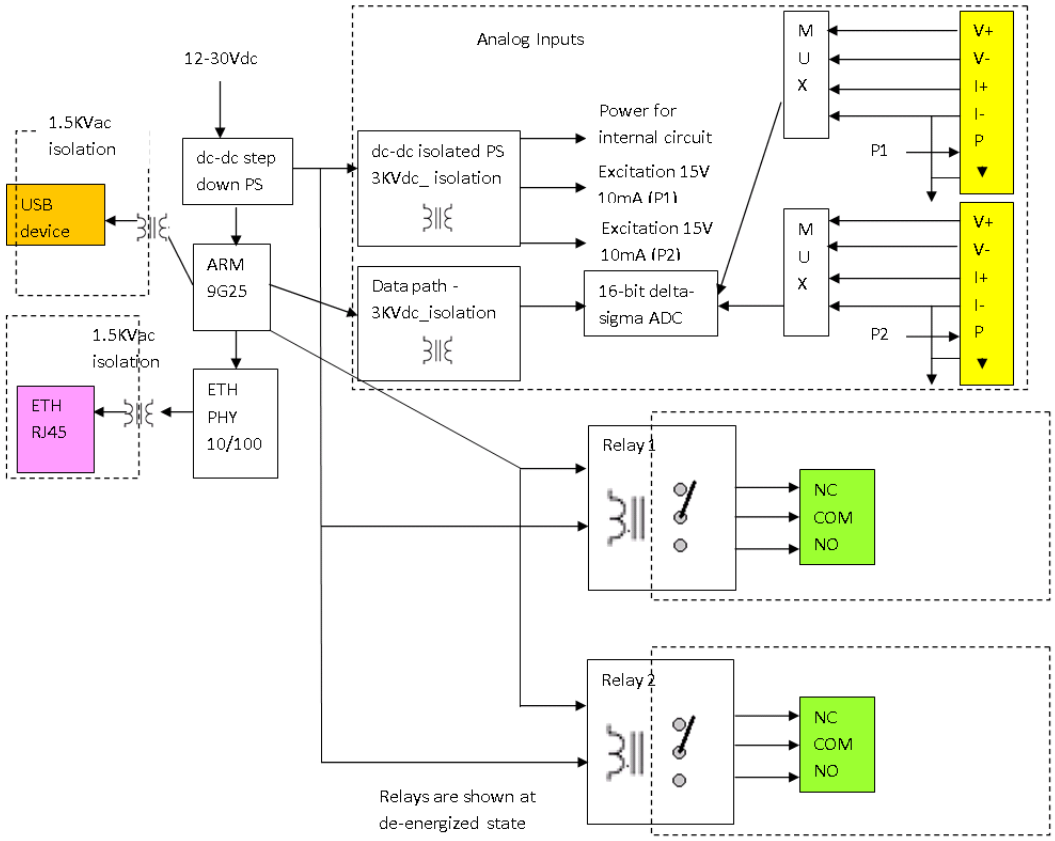
User-Supplied Items

To complete your installation, you need the following items:

- Devices to be controlled by relay
- Analog devices and sensors that require network connectivity.
- An available connection to your Ethernet network and an Ethernet cable.
- A working AC power outlet if the unit will be powered from an AC power adapter.
- A 9-30VDC power supply either terminal screw or barrel input (both may be used simultaneously for power redundancy)

xSenso 21R2 Block Diagram

Figure 5-1 xSenso 21R2 Isolation Block Diagram



Hardware Components

Front/Top Panel

The following components are located on the front panel (*Figure 5-2*) of the xSenso 21R2:

- **USB Port** - for managing and configuring xSenso device.
- **RJ-45 Ethernet Port** (with Ethernet LEDs) - can connect to an Ethernet (10 Mbps) or Fast Ethernet (100 Mbps) network.
- **RST Button** (the *Reset Button* inside the pin hole) - power cycles and restores factory default settings.
- **LED Indicators** (4 Analog Input/Output LEDs, 2 Ethernet LEDs, and 1 Diagnostic “X” LED) - see *Table 5-4* and *Table 5-5* to learn how to read the LED indicators.

LED Indicators

The Analog Input LEDs, the Relay Output LEDs, the Ethernet LEDs, and the Diagnostic “X” LED are all located on the front panel of the xSenso device (*Figure 5-2*).

Figure 5-2 xSenso 21R2, Front View

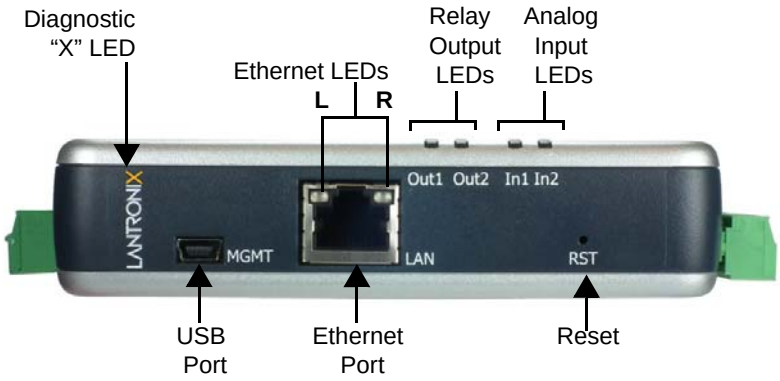


Figure 5-3 xSenso 21R2 Top/Front View

Table 5-4 and *Table 5-5* below explain the LED information displayed in *Figure 5-2* and *Figure 5-3* above.

Table 5-4 Analog Input and Relay Output LEDs

LED	Color	ON	OFF
"X" on top of xSenso device (Diagnostic)	**Orange**	**ORANGE ON** - power present **ORANGE Blink** - during boot process after power cycle or reset. Also blink patterns represent error conditions: ◆ **Loss of Redundant Power**: one slow blink followed by two fast blinks (repeat) ◆ **No Ethernet Link**: two slow blinks followed by two fast blinks (repeat) ◆ **No IP Address**: three slow blinks followed by three fast blinks (repeat)	No power
Analog Input 1	**Green or Orange**	Input Type (voltage or current) ◆ **GREEN** represents 100mV, 1V or 10V input range is selected ◆ **ORANGE** represents 20mA input range is selected	Input not utilized
Analog Input 2	**Green or Orange**	Input Type (voltage or current) ◆ **GREEN** represents 100mV, 1V or 10V input range is selected ◆ **ORANGE** represents 20mA input range is selected	Input not utilized
Relay Output 1	**Green**	◆ **GREEN** represents relay is turned on/energized. (i.e. COM = NO)	OFF represents relay is turned off (i.e. COM = NC)
Relay Output 2	**Green**	◆ **GREEN** represents relay is turned on/energized. (i.e. COM = NO)	OFF represents relay is turned off (i.e. COM = NC)

Table 5-5 Ethernet LEDs

Ethernet LEDs	Description
Left (L)	**GREEN ON** - 100 Mbps link established **GREEN Blink** - 100Mbps activity **AMBER ON** - 10 Mbps link established **AMBER Blink** - 10 Mbps activity
Right (R)	**GREEN ON** - Full duplex **OFF** - Half duplex

Reset Button

You can reset the xSenso to factory default settings, including clearing the network settings. The IP address, gateway, and netmask are set to 00s.

To reset the unit to factory defaults:

1. Place the end of a paper clip or similar object into the RST (reset) opening (see *Figure 5-2*) and press and hold down micro switch during a power cycle for a minimum of 25 seconds.
2. Remove the paper clip to release the button. The unit will continue the boot process restoring it back to the original factory default settings.

To reboot the unit without resetting the unit to factory defaults:

1. Place the end of a paper clip or similar object into the **RST** (reset) opening (see *Figure 5-2*) and press and hold down micro switch during a power cycle for 3 to 5 seconds.
2. Remove the paper clip to release the button. The unit will reboot.

Side Panels

The following are located on the side panels (*Figure 5-6*):

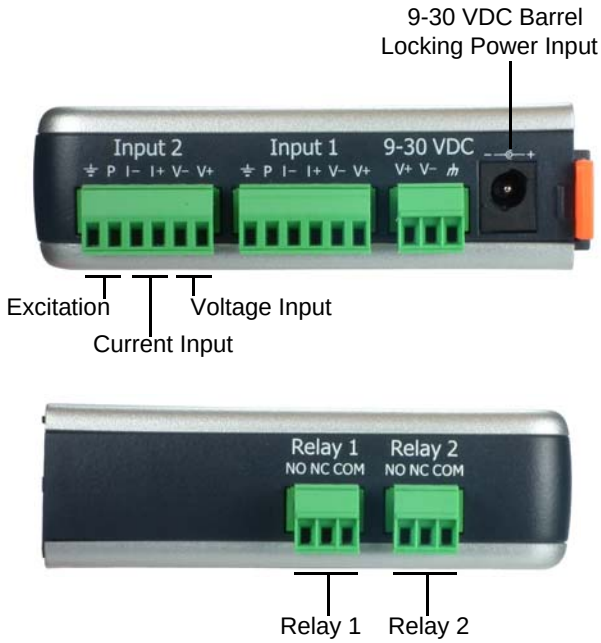
Left Side

- Analog Input 1
- Analog Input 2
- 9-30 VDC 3 Pin Terminal Block Power Input
- 9-30 VDC Barrel Locking Power Input

Right Side

- Relay Output 1
- Relay Output 2

Figure 5-6 xSenso, Side Views



Back Panel

On the xSenso back panel, there is a mounting bracket with a sliding orange clip which allows you to mount and dismount the device from a DIN rail, as shown in *Figure 5-7*. There are also four rubber feet that can be attached to the bottom-side of the device, if the xSenso is to be placed on a flat surface.

Figure 5-7 xSenso Bottom/Back Panel View

Installing the xSenso

Be sure to place or mount the device securely on a flat horizontal or vertical surface. The device comes with mounting brackets for mounting the device vertically, for example on a wall. If using AC power, avoid outlets controlled by a wall switch.

Observe the following guidelines when connecting the analog input and output devices:

- It is recommended to use twisted-pair wires to connect analog sensors and xSenso. If EMC is a concern, shielded wires and/or ferrite bead may be used to improve signal integrity in noisy environment.
- Connect your RJ-45 Ethernet cable to the RJ-45 port of the unit.
- The xSenso supports a power range of 9 to 30 VDC. You can power up the device with barrel-power connector and/or the 3 pin terminal connector for backup power supply.

Note: *As soon as you plug the device into power, the device/sensors powers up automatically, the self-test begins, and LEDs would indicate the device's status*

Perform the following steps to install your device:

1. Connect analog devices to the analog input and relay output ports.
2. Hook up power excitations from xSenso to analog sensors/devices if needed and if xSenso meets the power requirement.
3. Connect a RJ-45 Ethernet cable between the unit and your Ethernet network.
4. Plug the xSenso into the power outlet by using the included power supply.
5. Power up analog input devices/sensors if they are not powered by xSenso excitation.
6. Power up device to be controlled by relay or supply power to be controlled by relay.

6: Using DeviceInstaller

This chapter covers the steps for locating a xSenso unit and viewing its properties and device details. DeviceInstaller is a free utility program provided by Lantronix that discovers, configures, upgrades and manages Lantronix Device Servers.

Notes:

- *For instructions on using DeviceInstaller to configure the IP address and related settings or for more advanced features, see the DeviceInstaller Online Help.*
- *Auto IP generates a random IP address in the range of 169.254.0.1 to 169.254.255.254, with a netmask of 255.255.0.0, if no BOOTP or DHCP server is found. These addresses are not routable.*

Accessing xSenso Using DeviceInstaller

Note: *Make note of the MAC address. It is needed to locate the xSenso using DeviceInstaller.*

To use the DeviceInstaller utility, first install the latest version from the downloads page on the Lantronix web site www.lantronix.com/downloads.

1. Run the executable to start the installation process and respond to the installation wizard prompts. (If prompted to select an installation type, select **Typical**.)
2. Click **Start -> All Programs -> Lantronix -> DeviceInstaller 4.3 -> DeviceInstaller**.
3. When DeviceInstaller starts, it will perform a network device search. To perform another search, click **Search**.
4. Expand the xSenso folder by clicking the + symbol next to the folder icon. The list of available Lantronix xSenso devices appears.
5. Select the xSenso unit by expanding its entry and clicking on its IP address to view its configuration.
6. On the right page, click the **Device Details** tab. The current xSenso configuration appears. This is only a subset of the full configuration; the full configuration may be accessed via Web Manager, CLI or XML.

Device Detail Summary

Note: *The settings are Display Only in this table unless otherwise noted*

Current Settings	Description
Name	Shows “xSenso 2100”, “xSenso 21A2” or “xSenso 21R2”.
DHCP Device Name	The name associated with the xSenso’s current IP address, if the IP address was obtained dynamically.

Current Settings	Description
Group	Configurable field. Enter a group to categorize the xSenso. Double-click the field, type in the value, and press Enter to complete. This group name is local to this PC and is not visible on other PCs or laptops using DeviceInstaller.
Comments	Configurable field. Enter comments for the xSenso. Double-click the field, type in the value, and press Enter to complete. This description or comment is local to this PC and is not visible on other PCs or laptops using DeviceInstaller.
Device Family	Shows the xSensodevice family type as “xSenso”.
Short Name	Shows “xSenso 2100”, “xSenso 21A2” or “xSenso 21R2” by default.
Long Name	Shows Lantronix xSenso 2100”, “Lantronix xSenso 21A2” or “Lantronix xSenso 21R2” by default.
Type	Shows the device type as “xSenso 2100 Series””.
ID	Shows the xSenso ID embedded within the unit.
Hardware Address	Shows the xSenso hardware (MAC) address.
Firmware Version	Shows the firmware currently installed on the xSenso.
Extended Firmware Version	Provides additional information on the firmware version.
Online Status	Shows the xSenso status as Online, Offline, Unreachable (the xSenso is on a different subnet), or Busy (the xSenso is currently performing a task).
IP Address	Shows the xSenso current IP address. To change the IP address, click the **Assign IP** button on the **DeviceInstaller** menu bar.
IP Address was Obtained	Appears “Dynamically” if the xSenso automatically received an IP address (e.g., from DHCP). Appears “Statically” if the IP address was configured manually. If the IP address was assigned dynamically, the following fields appear: ◆ **Obtain via DHCP** with values of True or False. ◆ **Obtain via BOOTP** with values of True or False.
Subnet Mask	Shows the subnet mask specifying the network segment on which the xSenso resides.
Gateway	Shows the IP address of the router of this network. There is no default.
Number of Analog Inputs	Shows the number of analog inputs on the xSenso device.
Number of Analog Outputs	Shows the number of analog outputs on the xSenso device. ***Note:*** *This field only displays for xSenso 21A2 models.*
Number of Relay Outputs	Shows the number of relay outputs on the xSenso device. ***Note:*** *This field only displays for xSenso 21R2 models.*
Supports Configurable Pins	Shows False, indicating configurable pins are not available on the xSenso.
Supports Email Triggers	Shows True, indicating email triggers are available on the xSenso .
Telnet Supported	Indicates whether Telnet is enabled on this xSenso.
Telnet Port	Shows the xSenso port for Telnet sessions.
Web Port	Shows the xSenso port for web sessions.
Firmware Upgradable	Shows True, indicating the xSenso firmware is upgradable as newer versions become available.

7: Configuration Using Web Manager

This chapter describes how to configure xSenso using Web Manager, the Lantronix browser-based configuration tool. The unit's configuration is stored in nonvolatile memory and is retained without power. All changes take effect immediately, unless otherwise noted. It contains the following sections:

Accessing Web Manager

Note: *You can also access the Web Manager by selecting the Web Configuration tab on the DeviceInstaller window.*

To access Web Manager, perform the following steps:

1. Open a standard web browser. Lantronix supports the latest version of Internet Explorer, Mozilla Suite, Mozilla Firefox, Safari, Chrome or Opera.

Note: *Lantronix recommends using the latest version of Chrome when viewing and configuring the Chart tab/page.*

2. Enter the IP address or hostname of the xSenso in the address bar. The IP address may have been assigned manually using DeviceInstaller (see the *xSenso Quick Start Guide*) or automatically by DHCP.
3. Enter your username and password.The factory-default username is "**admin**" and the password is "**PASS**". The xSenso Home page displays with a brief summary of current status information about your xSenso device including product information, network settings and analog status information.

Figure 7-1 xSenso Home Pages

There are three xSenso models. The Home page for each model is identical except for these differences:

1) The xSenso model can be identified to the right of the Product Type in the Home page.

Product Information	
Product Type	Lantronix xSenso 21A2 (xSenso 21A2)
Firmware Version	7.6.0.0R10
Serial/MAC Address	0080A3942A03
Uptime	1 days 01:58:53
Network Settings	
Hostname	
IP Address	172.19.229.212/16
Default Gateway	172.19.0.1
Analog Status	
Input 1	+0.00031V [on]
Input 2	+0.00031V
Output 1	+4.0V
Output 2	0.0V

2) xSenso 21A2 has two additional output status fields.

Product Information	
Product Type	Lantronix xSenso 21R2 (xSenso 21R2)
Firmware Version	7.6.0.0R10
Serial/MAC Address	0080A3942A00
Uptime	1 days 02:09:15
Network Settings	
Hostname	
IP Address	172.19.229.211/16
Default Gateway	172.19.0.1
Analog Status	
Input 1	+0.00032V [on]
Input 2	+0.00031V
Relay 1	Off
Relay 2	Off

3) xSenso 21R2 has two additional relay status fields.

4. Click the **Admin** tab to get to the **Admin > Device Status** page. The Device Status web page displays the same and more information than on the xSenso Home page: configuration, network settings, analog status, tunneling settings, and product information.

Figure 7-2 Device Status Pages

Product Information	
Product Type:	Lantronix xSenso 21A2 (xSenso 21A2)
Firmware Version:	7.6.0.0R10
Build Date:	Jan 17 14:59:49 PST 2013
Serial Number:	0080A3942A03
Uptime:	1 days 01:09:10
Permanent Config:	Saved.
Network Settings	
Interface (eth0)	
Link:	Auto 10/100 Mbps Auto Half/Full (100 Mbps Full)
MAC Address:	00:80:A3:94:2A:03
Hostname:	<None>
IP Address:	172.19.229.212/16
Default Gateway:	172.19.0.1
Domain:	<None>
Primary DNS:	<None>
Secondary DNS:	<None>
MTU:	1500
Analog Status	
Analog Input 1:	+0.00031 V
Analog Input 2:	+0.00031 V
Analog Output 1:	+4.0 V
Analog Output 2:	0.0 V
Tunneling	Accept Mode
Tunnel 1:	Waiting
Tunnel 2:	Waiting

There are three xSenso models. The Device Status page for each model is identical except for these differences:

1) The xSenso model can be identified to the right of the Product Type in the Home page.

2) xSenso 21A2 has two additional output status fields.

3) xSenso 21R2 has two additional relay status fields.

Product Information	
Product Type:	Lantronix xSenso 21R2 (xSenso 21R2)
Firmware Version:	7.6.0.0R10
Build Date:	Jan 17 14:59:49 PST 2013
Serial Number:	0080A3942A00
Uptime:	1 days 02:02:44
Permanent Config:	Saved.
Network Settings	
Interface (eth0)	
Link:	Auto 10/100 Mbps Auto Half/Full (100 Mbps Full)
MAC Address:	00:80:A3:94:2A:00
Hostname:	<None>
IP Address:	172.19.229.211/16
Default Gateway:	172.19.0.1
Domain:	<None>
Primary DNS:	<None>
Secondary DNS:	<None>
MTU:	1500
Analog Status	
Analog Input 1:	+0.00032 V
Analog Input 2:	+0.00031 V
Relay 1:	Off
Relay 2:	Off
Tunneling	Accept Mode
Tunnel 1:	Waiting
Tunnel 2:	Waiting

Note: *The Logout button is available on any web page under the Setup and Admin Tab-Pages when authentication is enabled (by default). Logging out of the web page would force re-authentication to take place the next time the web page is accessed.*

xSenso Home and Device Status Pages

The xSenso Home page is the first page that appears after you log into Web Manager. The Device Status page appears when you click **Status** in the **Admin** tab/page in Web Manager.

The xSenso Home page and the Device Status pages show overlapping information. For most users, the xSenso Home page contains the basic product and status information necessary. For advanced users, the Device Status page contains additional configuration information:

Table 7-3 Comparing xSenso Home Page and Device Status Page Information

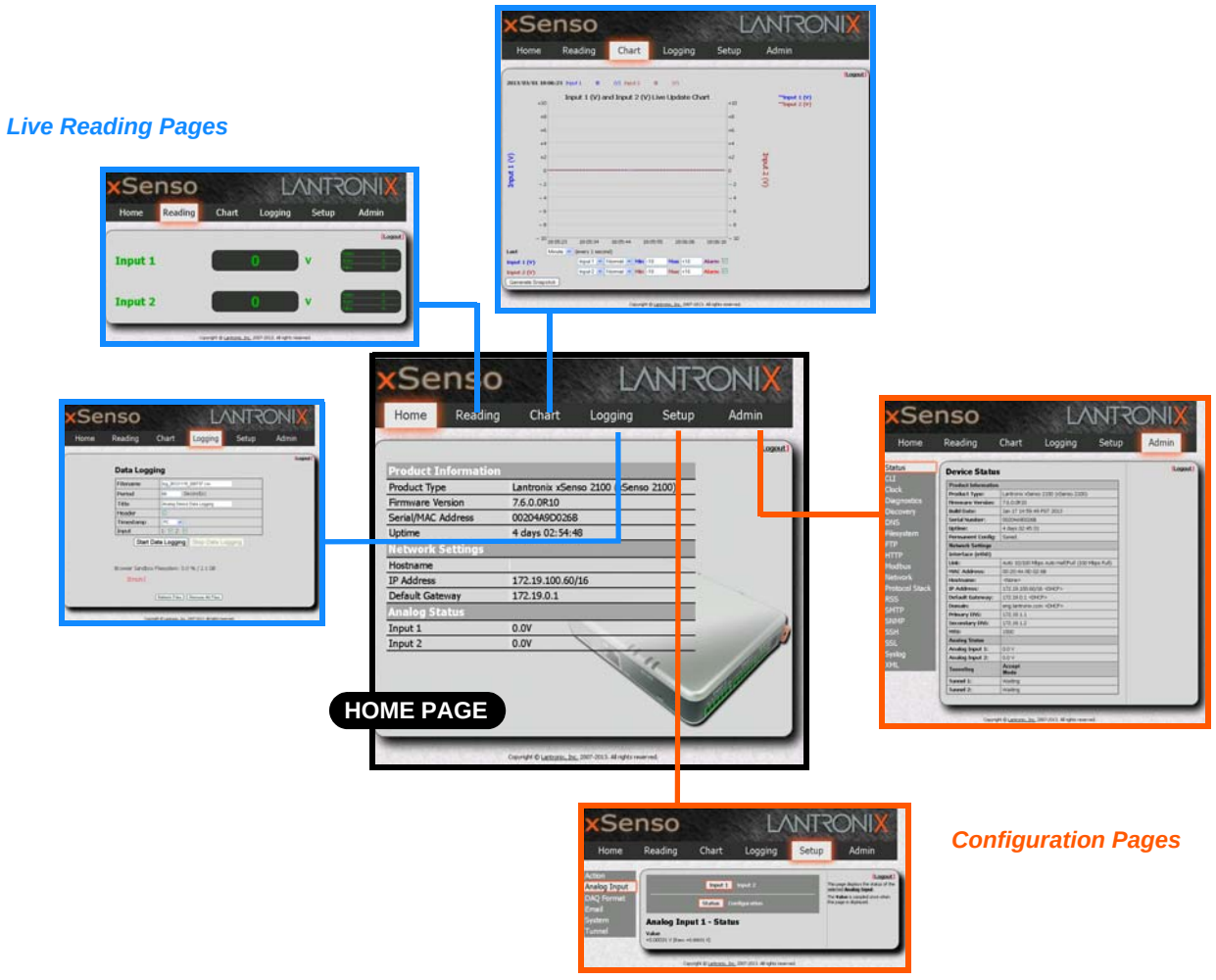
Information Provided	xSenso Home Page	Device Status Page
Product Type	**x**	**x**
Firmware Version	**x**	**x**
Build Date		**x**
Serial Number/MAC Address	**x**	**x**
Uptime	**x**	**x**
Permanent Config		**x**
Interface		**x**
Link		**x**
MAC Address		**x**
Hostname	**x**	**x**
IP Address	**x**	**x**
Default Gateway	**x**	**x**
Domain		**x**
Primary DNS		**x**
Secondary DNS		**x**
MTU		**x**
Input 1	**x**	**x**
Input 2	**x**	**x**
Output 1 (only for xSenso 21A2)	**x**	**x**
Output 2 (only for xSenso 21A2)	**x**	**x**
Relay 1 (only for xSenso 21R2)	**x**	**x**
Relay 2 (only for xSenso 21R2)	**x**	**x**
Tunnel 1		**x**
Tunnel 2		**x**

Live Reading Pages and Configuration Pages

There are five tabs that span the top of the Web Manager page. Beyond the xSenso Home page accessed through the Home tab at the top left, you may access the other Web Manager pages through the four other tabs. The Reading, Chart and Logging tab/pages provide live data on the analog input signals and the Setup and Admin tab/pages provide configuration menus:

- **Reading**: view live readings of analog input, output and relay data.
- **Chart**: view live, customizable charts of analog input, output and relay data.
- **Logging**: view and customize data logs of analog input, output and relay data.
- **Setup**: access the configuration menu to the Action, Analog Input, Analog Output, Relay, DAQ Format, Email, System and Tunnel configuration pages.
- **Admin**: access the configuration menu to the Status, CLI, Clock, Diagnostics, Discovery, DNS, Filesystem, FTP, HTTP, Modbus, Network, Protocol Stack, RSS, SMTP, SNMP, SSH, SSL, Syslog and XML configuration pages.

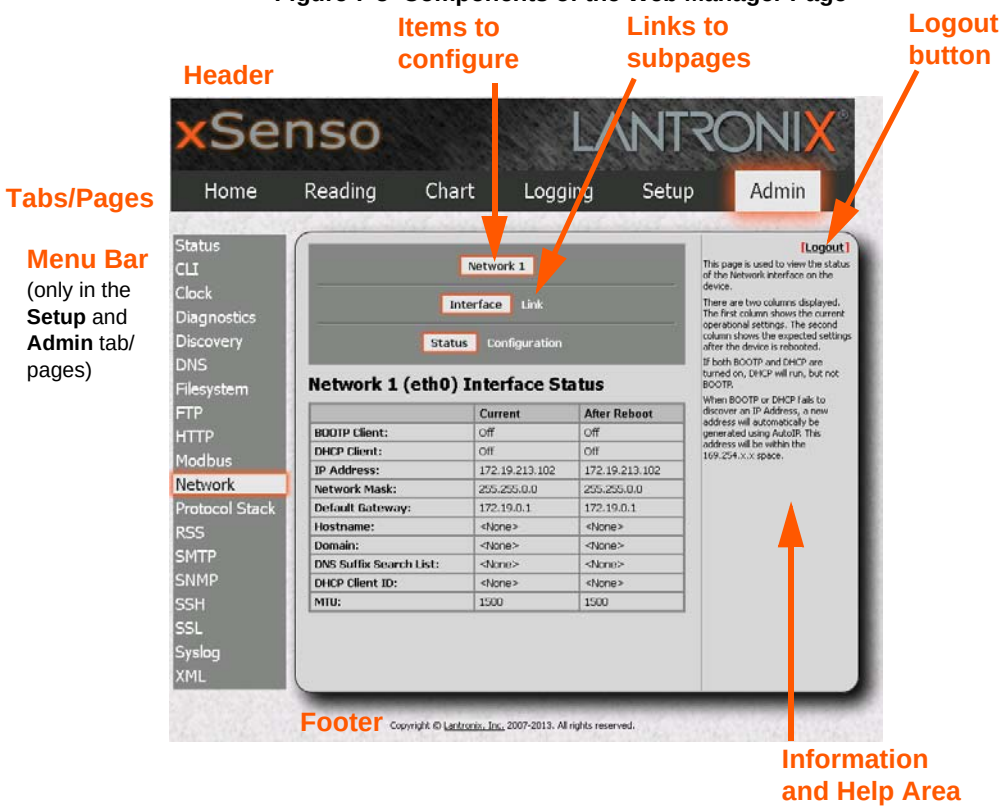
Figure 7-4 Live Reading vs. Configuration Pages



Web Manager Components

The layout of a typical Web Manager page is below.

Figure 7-5 Components of the Web Manager Page



Web Manager pages have these sections:

- The **Home**, **Reading**, **Chart**, **Logging**, **Setup** and **Admin** tabs at the top of the page provide direct access to each Web Manager page of the same name. All the functionality in Web Manager is divided between these tab/pages. For instance, clicking the **Admin** tab brings you to the **Admin** page or the **Reading** tab to get to the **Reading** page.
- The **Reading**, **Chart** and **Logging** tab/pages provide live sensor data. These pages together with the **xSenso Home** page, are designed for users who are simply monitoring analog input, output and relay data.
- The **Setup** and **Admin** tab/pages contain several subpages allowing viewing and configuration of various settings. These pages would be useful for an advanced user wishing to view and modify xSenso configurations.

The menu bar appears at the left side of the **Setup** and **Admin** pages. The menu bar lists the names of the subpages available in the **Setup** and **Admin** pages in Web Manager. To bring up a page, click it in the menu bar.

- Links near the top of many of the pages under **Setup** and **Admin**, such as the one in the example above, enable you to link to additional pages. On some pages, you must also select the item you are configuring, such as a tunnel.
- In the middle of many pages, you can select or enter new configuration settings. Some pages show status or statistics in this area rather than allow you to enter settings.

- At the bottom of most pages, the current configuration is displayed. In some cases, you can reset or clear a setting.
- The information or help area shows information or instructions associated with the page.
- A **Logout** link is available at the upper right corner of every **Setup** and **Admin** page. In Chrome or Safari, it is necessary to close out of the browser to completely logout. If necessary, reopen the browser to log back in.
- The footer appears at the very bottom of the page. It contains copyright information and a link to the Lantronix home page.

Navigating Web Manager

The Web Manager provides an intuitive point-and-click interface. A menu bar on the left side of each page provides links you can click to navigate from one page to another while the Reading, Chart and Logging pages are accessed by tabs across the top of the page. Some pages are read-only, while others let you change configuration settings.

Note: *There may be times when you must reboot the xSenso for the new configuration settings to take effect. The chapters that follow indicate when a change requires a reboot. Anytime you reboot the unit, this operation will take some time to complete. Please wait a minimum of 10-20 seconds after rebooting the unit before attempting to make any subsequent connections.*

Web Manager Page	Description	See Page
Status	Shows product information, network, analog status, and tunneling settings.	*45*
Action	Allows you to view and configure the actions for a specific alarm or report.	*66*
Analog Input	Allows you to view and configure analog input, shows current input status and allows you to scale and modify display of both analog inputs.	*55*
Analog Output	Allows you to view and configure analog output, shows current output statuses and allows you to modify display of analog outputs.	*56*
Charting	Shows data on a live chart and chart configuration options.	*59*
CLI	Shows Command Line Interface (CLI) statistics and lets you change the current CLI configuration settings.	*104*
Clock	Allows you to view and configure the current date, time and time zone as it displays in web manager.	*100*
DAQ Format	Allows you to change data response format in Tunnel and Action connect applications.	*53*
Diagnostics	Lets you perform various diagnostic procedures.	*96*
Discovery	Allows you to view and modify the configuration and statistics for device discovery.	*102*
DNS	Shows the current configuration of the DNS subsystem and the DNS cache.	*77*
Email	Shows email statistics and lets you clear the email log, configure email settings, and send an email.	*103*
Filesystem	Shows file system statistics and lets you browse the file system to view a file, create a file or directory, upload files using HTTP, copy a file, move a file, or perform TFTP actions.	*92*

Web Manager Page (continued)	Description	See Page
FTP	Shows statistics and lets you change the current configuration for the File Transfer Protocol (FTP) server.	*78*
HTTP	Shows HyperText Transfer Protocol (HTTP) statistics and lets you change the current configuration and authentication settings.	*79*
Logging	Shows analog input, output and relay information through a live log and provides log file configuration options.	*61*
Modbus	Shows the current connection status of the Modubs servers listening on the TCP ports and configure Modbus TCP server.	*75*
Network	Shows status and lets you configure the network interface.	*50*
Protocol Stack	Lets you perform lower level network stack-specific activities.	*94*
Query Port	Lets you change configuration settings for the query port.	*96*
Reading	Shows live analog input, output and relay reading information.	*64*
Relay	Allows you to view and configure relay output, shows current relay output statuses and allows you to modify display of both relays.	*57*
RSS	Lets you change current Really Simple Syndication (RSS) settings.	*81*
SMTP	Shows and modify the current configuration of SMTP.	*83*
SNMP	Shows and modify the current configuration of SNMP.	*82*
SSH	Lets you change the configuration settings for SSH server host keys, SSH server authorized users, SSH client known hosts, and SSH client users.	*85*
SSL	Lets you upload an existing certificate or create a new self-signed certificate.	*88*
Syslog	Lets you specify the severity of events to log and the server and ports to which the syslog should be sent.	*78*
System	Lets you reboot device, restore factory defaults, upload new firmware, and change the device long and short names.	*101*
Tunnel	Lets you change the current configuration settings for an incoming tunnel connection.	*73*
XML	Lets you export XML configuration and status records, and import XML configuration records.	*106*

8: Network Settings

The Network Settings show the status of the Ethernet interface/link and let you configure the settings on the device. Interface settings are related to the configuration of the IP and related protocols. Link settings are related to the physical link connection, which carries the IP traffic.

The xSenso contains one network interface. The Ethernet interface is also called interface 1 or eth0.

Notes:

- *Some settings require a reboot to take effect. These settings are noted below.*
- *Wait a minimum of 10-20 seconds after rebooting the unit before attempting to make any subsequent connections.*
- *The blue text in the XML command strings of this chapter are to be replaced with a user-specified name.*

Network Interface Settings

Table 8-1 shows the network interface settings that can be configured.

Table 8-1 Network Interface Settings

Network Interface Settings	Description
BOOTP Client	Select to turn **On** or **Off**. At boot up, after the physical link is up, the xSenso will attempt to obtain IP settings from a BOOTP server. ***Note:*** *Overrides the configured IP address/mask, gateway, hostname, and domain. When DHCP is **Enabled**, the system automatically uses DHCP, regardless of whether BOOTP is **Enabled**. Changing this value requires you to reboot the device.*
DHCP Client	Select to turn **On** or **Off**. At boot up, after the physical link is up, the xSenso will attempt to obtain IP settings from a DHCP server and will periodically renew these settings with the server. ***Note:*** *Overrides BOOTP, the configured IP address/mask, gateway, hostname, and domain. Changing this value requires you to reboot the device.* ***Note:*** *Within WebManager, click **Renew** to renew the DHCP lease.*
IP Address	Enter the static IP address to use for the interface. You may enter it alone or in CIDR format. ***Note:*** *This setting will be used if Static IP is active (both DHCP and BOOTP are **Disabled**). Changing this value requires you to reboot the device. When DHCP or BOOTP is enabled, the xSenso tries to obtain an IP address from a DHCP or BOOTP server. If it cannot, the xSenso generates and uses an Auto IP address in the range of 169.254.xxx.xxx, with a network mask of 255.255.0.0.*
Default Gateway	Enter the IP address of the router for this network. ***Note:*** *This setting will be used if Static IP is active (both DHCP and BOOTP are **Disabled**).*

Network Interface Settings (continued)	Description
Hostname	Enter the hostname for the interface. It must begin with a letter or number, continue with a sequence of letters, numbers, or hyphens, and end with a letter or number. ***Note:*** *This setting will take effect immediately, but will not register the hostname with a DNS server until the next reboot.*
Domain	Enter the domain name suffix for the interface. ***Note:*** *This setting will be used when either Static IP or Auto IP is active, or if DHCP/BOOTP is active and no Domain Suffix was acquired from the server.*
DHCP Client ID	Enter the ID if the DHCP server requires a DHCP Client ID option. The DHCP server's lease table shows IP addresses and MAC addresses for devices. The lease table shows the Client ID, in hexadecimal notation, instead of the xSenso MAC address.
Primary DNS	Enter the IP address of the primary Domain Name Server. ***Note:*** *This setting will be used when either Static IP or Auto IP is active, or if DHCP/BOOTP is active and no DNS server was acquired from the server.*
Secondary DNS	Enter the IP address of the secondary Domain Name Server. ***Note:*** *This setting will be used when either Static IP or Auto IP is active, or if DHCP/BOOTP is active and no DNS server was acquired from the server.*
MTU	When DHCP is enabled, the MTU size is (usually) provided with the IP address. When not provided by the DHCP server, or using a static configuration, this value is used. The MTU size can be from 576 to 1500 bytes, the default being 1500 bytes.

To Configure Network Interface Settings

Using Web Manager

- To modify Ethernet (eth0) settings, go to the **Admin** tab/page, go to the **Admin** tab/page, click **Network** on the menu and select **Network 1 -> Interface -> Configuration**.

Using the CLI

- To enter the eth0 command level: `enable -> config -> if 1`

Using XML

- Include in your file: `<configgroup name="interface" instance="eth0">`

To View Network Interface Status

Using Web Manager

In Network Interface Status, you can view both the current operational settings as well as the settings that would take affect upon a device reboot.

- To view Ethernet (eth0) Status, go to the **Admin** tab/page and click **Network** on the menu and select **Network 1 -> Interface -> Status**.

Network Link Settings

Physical link parameters can be configured for an Ethernet (eth0) Network Interface (see *Table 8-2*).

Table 8-2 Network 1 (eth0) Link Settings

Network 1 Ethernet (eth0) Link Settings	Description
Speed	Select the Ethernet link speed. (Default is Auto) ◆ **Auto** = Auto-negotiation of Link Speed ◆ **10 Mbps** = Force 10 Mbps ◆ **100 Mbps** = Force 100 Mbps
Duplex	Select the Ethernet link duplex mode. (Default is Auto) ◆ **Auto** = Auto-negotiation of Link Duplex ◆ **Half** = Force Half Duplex ◆ **Full** = Force Full Duplex

Notes:

- *When speed is **Auto**, duplex must be **Auto** or **Half**.*
- *When speed is not **Auto**, duplex must be **Half** or **Full**.*
- *Fixed speed Full duplex will produce errors connected to Auto, due to duplex mismatch.*

To Configure Network Link Settings

Using Web Manager

- To modify Ethernet (eth0) Link information, go to the **Admin** tab/page, and click **Network** on the menu and select **Network 1 -> Link**.

Using the CLI

- To enter the eth0 Link command level: `enable -> config -> if 1 -> link`

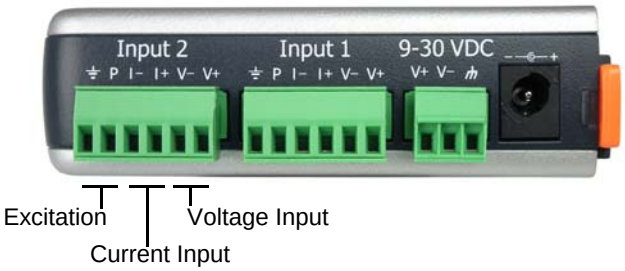
Using XML

- Include in your file: `<configgroup name="ethernet" instance="eth0">`

9: Analog Input, Output and Relay Settings

The xSenso supports two analog inputs (*Figure 9-1*) each of which may be configured to sense one of four analog signal ranges (±100mV, ±1V, ±10V and ±20mA) with options for selecting simple offset or scale and offset. xSenso 2100, xSenso 21A2 and xSenso 21R2 have the same analog inputs but xSenso 21A2 additionally has two analog outputs and xSenso 21R2 has two relay outputs.

Figure 9-1 Analog Inputs 1 and 2 for xSenso



DAQ Format

DAQ (Data Acquisition) Format configuration applies to Tunnel Accept and Alarm Connect data response.

Table 9-2 xSenso DAQ Command

Command	Description	Example	xSenso Model
AIN1	Reads Input 1 value.	AIN1\r +10.0000	xSenso 2100 xSenso 21A2 xSenso 21R2
AIN2	Reads Input 2 value.	AIN2\r -0.00031	xSenso 2100 xSenso 21A2 xSenso 21R2
AIN*	Reads all input values.	AINA\r +10.0000-0.00031	xSenso 2100 xSenso 21A2 xSenso 21R2
AOUT1	Reads Output 1 current value.	AOUT1\r +5.00000	xSenso 21A2
AOUT2	Reads Output 2 current value	AOUT1\r +10.0000	xSenso 21A2
AOUT*	Reads all current output values.	AOUT*\r +5.00000+10.0000	xSenso 21A2
AOUT1 <value>	Writes Output 1 value. Value must have float format: [+/-]<digits>.<digits>	AOUT1 +5.0\r SUBMITTED	xSenso 21A2

Command (continued)	Description	Example	xSenso Model
AOUT2 <value>	Writes Output 2 value. Value must have float format: [+/-]<digits>.<digits>	AOUT2 +10.0\r SUBMITTED	xSenso 21A2
ROUT1	Reads Relay 1 current setting.	ROUT1\r +1	xSenso 21R2
ROUT2	Reads Relay 2 current setting.	ROUT2\r +0	xSenso 21R2
ROUT*	Reads all current relay settings.	ROUT*\r +1 +0	xSenso 21R2
ROUT1 <0, 1, or 2>	Write Relay 1 setting: ◆ 0 to turn off relay ◆ 1 to turn on relay ◆ 2 to reset latched relay	ROUT1 1\r SUBMITTED	xSenso 21R2
ROUT2 <0, 1, or 2>	Write Relay 2 setting: ◆ 0 to turn off relay ◆ 1 to turn on relay ◆ 2 to reset latched relay	ROUT2 0\r SUBMITTED	xSenso 21R2

Table 9-3 DAQ Settings

DAQ Settings	Description
Time Type	Select **Uptime** or **Clock** time type. If Timestamp is enabled, this selection applies. Uptime represents the time since the device has powered up. To use Clock time, first go to Clock settings to set it up.
Timestamp	Select whether to enable a time stamp to be placed before each sample value.
Identifier	Select whether to enable an alphanumeric identifier to be placed before each sample value and optional timestamp.
Units	Select whether ot enable the applicable unit to be placed after each sample value.
End Character	Enter an end character to place this character at the tail end of sample strings. You may also delete field contents to remove the end character.

To Configure DAQ Settings

Using Web Manager

- To configure DAQ Settings, go to the **Setup** tab/page and click **DAQ Format** in the menu.

Using the CLI

- To enter the DAQ Settings command level:
  `enable -> config -> analog -> daqformat`

Using XML

- Include in your file: `<configgroup name="daq format">`

Analog Input

Table 9-4 Analog Input Settings

Input Settings	Description
Display	Select to enable or disable a scaled input value to be displayed with designated title and units in the web manager, XML and CLI analog chanel as well as Tunnel and Action Connect application. You can hide an input by disabling it if you are not using it.
Title	Enter the analog input title as it will appear in web manager, XML and CLI. Leave this field blank to utilize the default “Input N”, where N is the analog input number. For example, you can name the reading, “Temperature”, if a temperature sensor is connected to the xSenso device.
Range	Select input range from drop-down menu. Select the measurement range closest to your sensor output to get the most accurate measurement. ◆ Select **20mA** when input is connected to the I+ and I- terminals. ◆ Select **100nV**, **1V** or **10V** when input is connected to the V+ and V- terminals.
Adjustment	Select the offset adjustment: ◆ Select **Simple** offset so that the offset value is simply added to each analog input with the result presented as an analog reading. ◆ Select **Scale** and offset to linearly map each analog input sample to its reading value via specification of two points (one near each end of the linear mapping range).
Input Low	Enter the **Input Low** value which will be presented as the Reading Low value. For example, if a sensor measures -40° to 100°C with an output of 0 to10V, you can input input low 0°, input high 10°, reading low -40°, reading high 100° and unit "C".
Reading Low	Enter the **Reading Low** value which will be converted from the **Input Low** value.
Input High	Enter the **Input High** value which will be presented as the **Reading High** value.
Reading HIgh	Enter the **Reading HIgh** value which will be presented as the **Input HIgh** value.
Offset	Enter the offset value through which each sampled analog input value may be adjusted. Offset may be positive or negative.
Decimal Point	Specify the maximum number of digits to be displayed to the right of the decimal point, according to the accuracy of signal source. Reading is always limited to have at 5 significant figures at most. For example, if the connected analog output sensor has an accuracy of 0.1°C, you can select decimal point to be 1.
Units	Enter the unit as it will appear after the presented analog input value. For example, you can input C or F if a temperature sensor is connected.
Alarm Type	Select alarm type to enable monitoring for high and/or low analog input readings: ◆ Select either **High** or **High and Low** to enable monitoring for a reading at or above the specified Alarm High value. ◆ Select **Low** or **High and Low** to enable monitoring for a reading at or below the specified Alarm Low value. ◆ Select **None** to disable monitoring reading for alarm low and/or high values.
Alarm High	Specify the **Alarm High** value; an analog input reading above this value that persists for **Delay** seconds will turn on the alarm.
Alarm Low	Specify the **Alarm Low** value; an analog input reading below this value that persists for **Delay** seconds will turn on the alarm.
Delay	Specify the **Delay** value in seconds; an analog input high or low reading that persists for **Delay** seconds will turn on the alarm.

To Configure Analog Settings

Using Web Manager

- To configure analog input, go to the **Setup** tab/page and click **Analog Input > Input 1 > Configuration** in the menu.

Using the CLI

- To enter the analog input command level: `enable -> config -> analog -> input <number>`

Using XML

- Include in your file: `<configgroup name="analog input" instance="1">`

Analog Output

Note: *Analog output is only available on the xSenso 21A2. When output is tracking input, input is the single source of control. When tracking is disabled, there will be no other source of control and the state of output is undefined. Instead of leaving it undefined, we just put it back to startup value which also serves as a safe value to be used when output is not defined (like during startup output is undefined before any control kicks in).*

Table 9-5 Analog Output Settings

Input Settings	Description
Display	Select to enable or disable an output value to be displayed with designated title and units in the web manager, XML and CLI analog chanel as well as Tunnel and Action Connect application. You can hide an output by disabling it if you are not using it.
Title	Enter the analog output title as it will appear in web manager, XML and CLI. Leave this field blank to utilize the default "Output N", where N is the analog output number. For example, you can name the reading, "Water Valve", if a water flow controlling valve is connected to the xSenso device.
Type	Select type of **Voltage** or **Current**: ◆ Select **Voltage** for an output range from 0 to 10 Volts. ◆ Select **Current** for an output range from 0 to 20 mA.
Startup Value	Enter the **Startup Value** for the initial output value that will be asserted after the device boots up. This will also take effect when **Analog Input** or **Type** is changed to avoid an undefined output. This value may subsequently be replaced by a value mapped from an input channel or by a value specified in an output command.
Analog Input	Select the appropriate **Analog Input** from the drop-down menu to specify the channel number of the analog input the output will track.
Reading Low	Enter the **Reading Low** value which will be presented as the **Output Low** value.
Output Low	Enter the **Output Low** value which will be converted from the **Reading Low** value.
Reading HIgh	Enter the **Reading HIgh** value which will be presented as the **Output HIgh** value.
Output HIgh	Enter the **Output High** value which will be converted from the **Reading High** value.

Input Settings	Description
Alarm Type	Select alarm type to enable monitoring for high and/or low analog output readings: ◆ Select either **High** or **High and Low** to enable monitoring for a reading at or above the specified Alarm High value. ◆ Select **Low** or **High and Low** to enable monitoring for a reading at or below the specified Alarm Low value.
Alarm High	Specify the **Alarm High** value; an analog output reading above this value that persists for **Delay** seconds will turn on the alarm.
Alarm Low	Specify the **Alarm Low** value; an analog output reading below this value that persists for **Delay** seconds will turn on the alarm.
Delay	Specify the **Delay** value in seconds; an analog output high or low reading that persists for **Delay** seconds will turn on the alarm.

To Configure Analog Output Settings

Using Web Manager

- To configure analog output, go to the **Setup** tab/page and click **Analog Output > Output 1 > Configuration** in the menu.

Using the CLI

- To enter the analog output command level: `enable -> config -> analog -> output <number>`

Using XML

- Include in your file: `<configgroup name="analog output" instance="1">`

Relay Output

Note: *Relay output is only available on the xSenso 21R2. When relay is energized/ turned on, Normally Open Port is closed to Common where Normally Closed Port is open/ disconnected from Common. When relay is de-energized/turned off, Normally Open Port is open/disconnected from Common where Normally Closed Port is closed to Common.*

Table 9-6 Relay Output Settings

Input Settings	Description
Display	Select to enable or disable a relay status to be displayed with designated title in the web manager, XML and CLI analog channel as well as Tunnel and Action Connect application. You can hide an relay status by disabling it if you are not using it.
Title	Enter the relay title as it will appear in web manager, XML and CLI. Leave this field blank to utilize the default "Relay N", where N is the relay number. For example, you can name the reading, "Buzzer", if a buzzer is connected to the xSenso device.

Input Settings (continued)	Description
Latch	Enable or disable Latch controls which determine how a relay will be turned off. ◆ Selecting **Enabled** will require a user to explicitly reset latched relay and then turn it off. ◆ Selecting **Disabled**, the relay will automaticaly turn off after any and all of the alarm triggers are no longer active.

To Configure Relay Settings

Using Web Manager

- To configure relay output, go to the **Setup** tab/page and click **Relay > Relay 1 > Configuration** in the menu.

Using the CLI

- To enter the relay command level:
  `enable -> config -> analog -> relay <number>`

Using XML

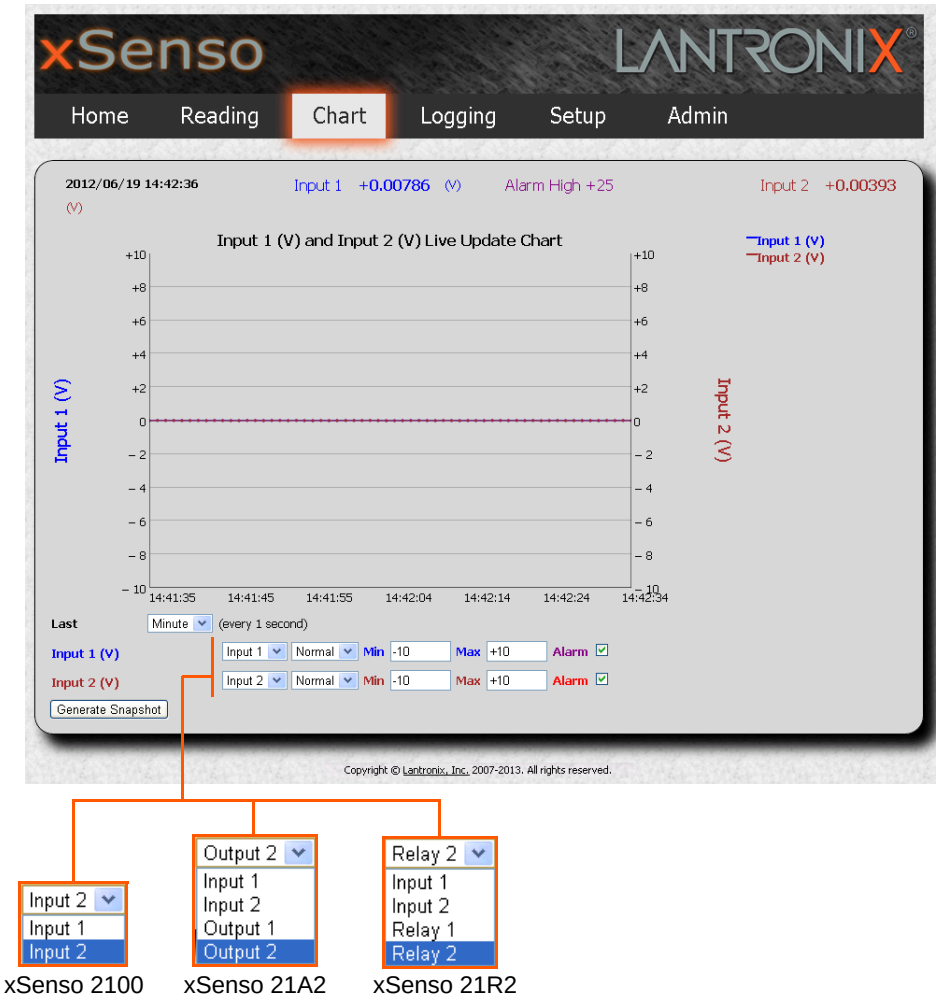
- Include in your file: `<configgroup name="relay" instance="1">`

10: Chart

Note: *Lantronix recommends using the latest version of Chrome when viewing and configuring the Chart tab.*

The xSenso Chart tab provides access to live charted analog input, output and relay information on the Chart page. The chart is configurable and includes an optional alarm indication function. Chart will poll data sample from xSenso every second. Titles and units are configurable under *Analog Input*, *Analog Output* and *Relay Output* settings (according to the xSenso device model; see *Figure 10-1*). You can point your mouse over data point to see the actual reading presented on the right side. You can also drag (press and hold mouse left button, drag across chart to see a box and then release left mouse button) to zoom into chart. Note that zoomed data may get shifted when the data expired in the current last time span setting. To reset zoom, double click on chart area. Data polled will be stored in web browser's cache upon leaving the page or closing the browser. Since browser stores cache per website, it is recommended to have a static IP, reserved IP address in DHCP server or access unit by hostname. It is highly recommended to use the latest web browser versions to run the chart. Running chart with IE8 or below will be very slow. Also, you may need to update your graphic card drivers to optimize chart stability.

Figure 10-1 Charting Options in the Chart Tab by xSenso Model



Data Chart Configuration

Table 10-2 Data Chart Settings

Data Chart Settings	Description
Last	Select the span of time to be charted: ◆ **Minute** (charts one full minute at 1 second intervals) ◆ **Hour** (charts one full hour at 5 second intervals) ◆ **Day** (charts one full day at 1 minute intervals) ◆ **Week** (charts one full week at 10 minute intervals) ◆ **Month** (charts one full month at 1 hour intervals)
Input 1/Input 2 **Output 1/Output2** **Relay 1/Relay 2**	Select from the drop-down menu to indicate the input, relay and/or output to be charted along the left/right y axis. Relay is charted as 1 if it is energized/turned on or 0 if it is de-energized/turned off. ***Note:*** *Output 1 and Output 2 selections are only supported in xSenso 21A2. Relay 1 and Relay 2 selections are only supported in xSenso 21R2. See Figure 10-1.*
Normal/Bold/Hide	Select from the drop-down menu to specify the visual appearance of the charted line to display on the chart.
Min	The minimum span associated with the y-axis of the chart.
Max	The maximum span associated with the y-axis of the chart.
Alarm	Check to enable display of current alarm point as a line across the time span.
Generate Snapshot	Click button to generate a snapshot of the chart at any moment. The snapshot of the chart will appear beneath the live chart. Save a snapshot by following these directions: 1) Right-click on the snapshot. 2) Select **Save As** in the popup menu. 3) Save image to desired location. ***Note:*** *This button appears only if a snapshot is not currently showing beneath the live chart.*
Remove Snapshot	Click to remove a snapshot at any moment. The snapshot of the chart will disappear from beneath the live chart. ***Note:*** *This button appears only if a snapshot is currently showing beneath the live chart.*

To Configure Data Chart Settings

Using Web Manager

- To view a chart, click the **Chart** tab to get to the **Chart** page.

11: Logging

The xSenso Logging tab/page provides access to the data logging feature available with browsers that support HTML5 and filesystem API (e.g., Chrome). Users can run customized data logs through this page. Upon the first visit, the browser will ask for your permission to allow this device to store data on your PC. Choose Ok. Browser will poll data from xSenso every period (1 minute default) as configured by user. Data is stored in the browser sandbox filesystem and its usage and total size is shown below the start/stop data logging button. In the past, webpages were not allowed to access the PC's local filesystem because this would raise security issues (this is exactly what a virus wants to do). A browser supporting filesystem API allows webpage to save data in its own dedicated sandbox filesystem, which becomes the only accessible webpage. Data logging application stores data here and you can click on the filename to download these log files from the sandbox filesystem to anywhere on your local computer, just like downloading any file from the web. Please note that the browser stores data in sandbox filesystem per website, so it is recommended to have static IP, reserved IP address in DHCP server or access unit by hostname. It is recommended to use dedicated PC to log data to optimize data logging stability.

Figure 11-1 xSenso 2100 Logging Tab

Figure 11-2 xSenso 21A2 Logging Tab

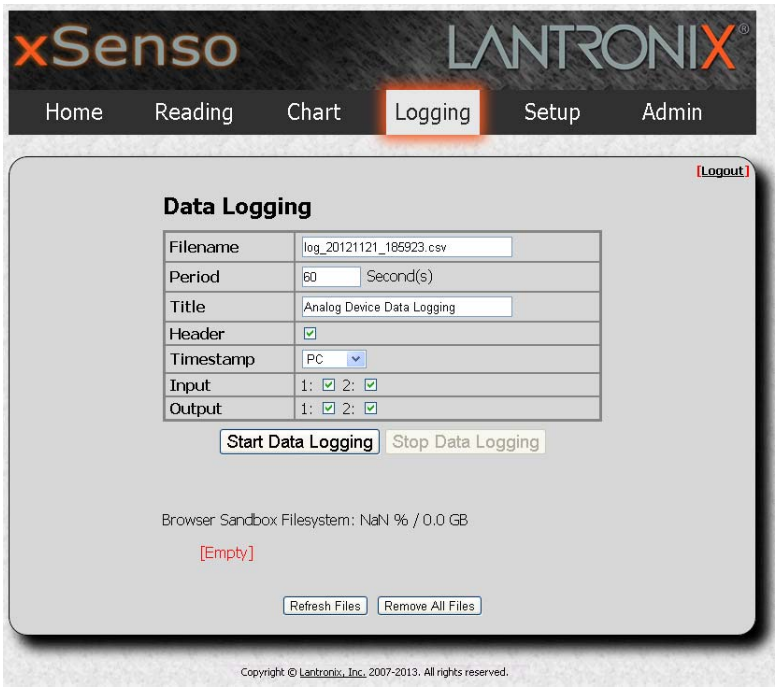
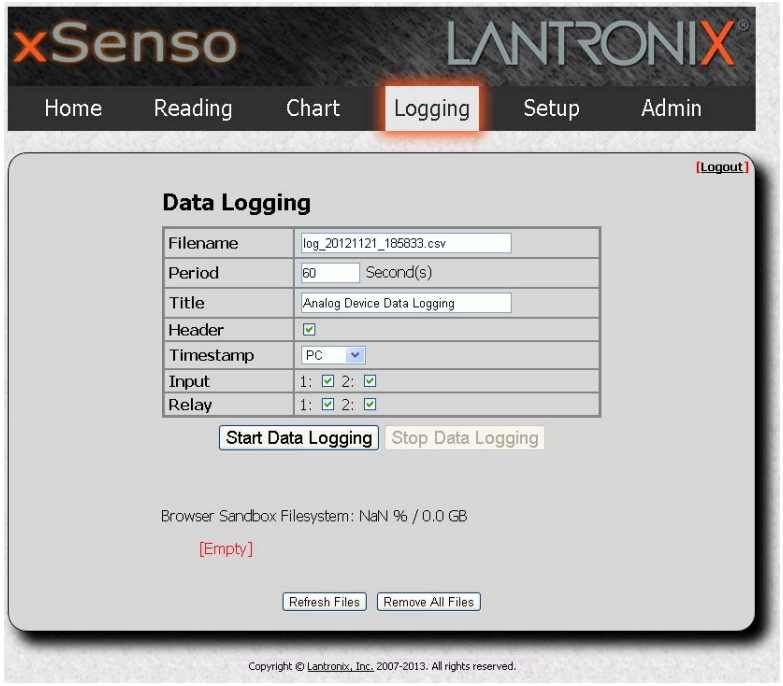


Figure 11-3 xSenso 21R2 Logging Tab



Data Logging Configuration

Table 11-4 Data Logging Settings

Data Logging Settings	Description
Filename	Enter the filename of the log file. This will be saved in the browser's sandbox filesystem.
Period	Specify in seconds, how often the browser will poll data from the xSenso device.
Title	Specify the title as it will appear in the log files. You can use this besides the filename to identify each data logging session.
Header‘	Check to enable or disable the header in the log files. Header gives you description of each column in the log file, e.g. Date and Time, Input 1 and Input 2.
Timestamp	Select timestamp logged should be generated from local PC running the web browser or time (uptime/clock) coming from the device.
Input	Check the analog inputs to be included in logging.
Output	Check the analog outputs to be included in logging. ***Note:*** *This option is only supported in xSenso 21A2.*
Relay	Check the relay outputs to be included in logging. ***Note:*** *This option is only supported in xSenso 21R2.*
Start Data Logging	Click button to manually begin data logging according to current user settings.
Stop Data Logging	Click button to manually stop data logging.
Refresh Files	Click button to refresh log files list. List may need to be refreshed in order to view all log files created when multiple data logging session happens on the same PC.
Remove All Files	Click button to delete any accumulated logs from from browser's sandbox filesystem.

To Configure Data Logging Settings

Using Web Manager

- To configure data logging, click the **Logging** tab to get to the **Logging** page.

12: Reading

The xSenso Reading tab provides access to a live readings page of analog inputs, outputs and relays. This page is read-only, providing the following dynamic information for each input and analog or relay outputs:

- Input Value
- Input Alarm High Value (if applicable)
- Input Alarm Low Value (if applicable)
- Input Maximum Value
- Input Average Value
- Input Minimum Value
- Output Value
- Output Alarm High Value (if applicable)
- Output Alarm Low Value (if applicable)
- Output Maximum Value
- Output Average Value
- Output Minimum Value
- Relay Output Value

Note: *Max, Min and Average input values will be lost if you navigate away from this page. Cumulative values are calculated since the last time the page was opened.*

Titles and units for this Reading page are configurable under *Analog Input*, *Analog Output* and *Relay Output* settings, according to xSenso model . You may also hide an input, outputs or relays by disabling its display. Data is polled from xSenso every second. Maximum, mininum and average values are calculated based on these data samples. To reset the maximum, mininum and average values, simply refresh the webpage. An input entering alarm zone will be blinking in red.

Figure 12-1 xSenso 2100 Reading Tab

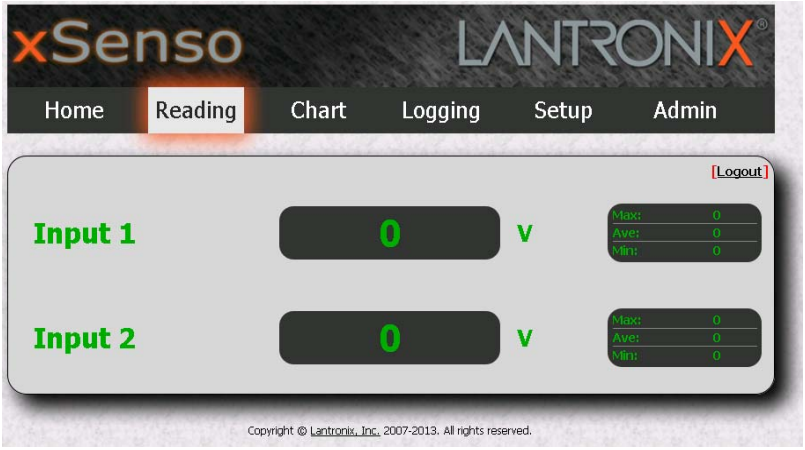


Figure 12-2 xSenso 21A2 Reading Tab

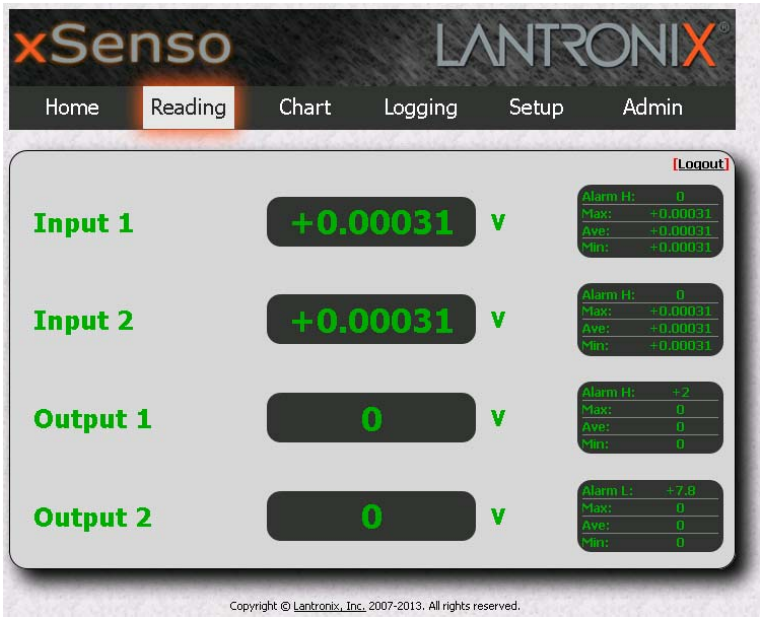
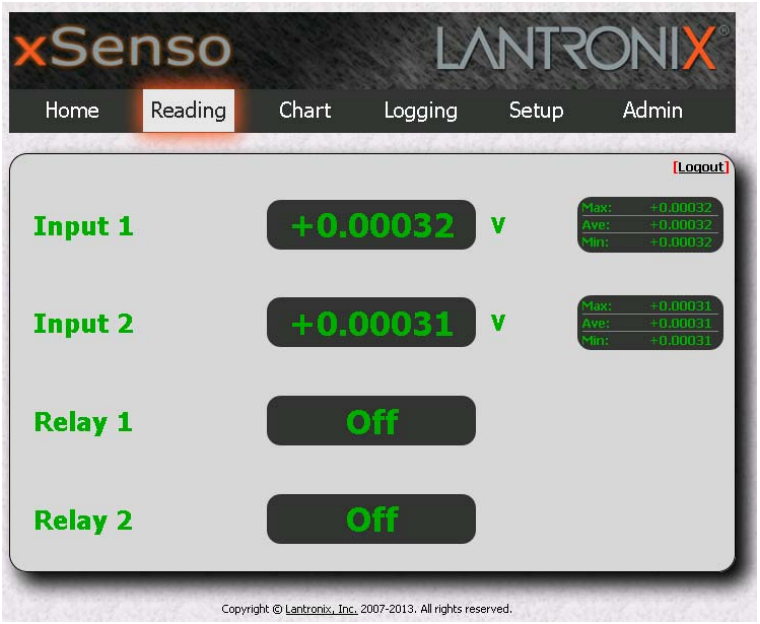


Figure 12-3 xSenso 21R2 Reading Tab



Data Reading Configuration

To View Data Reading Settings

Using Web Manager

- To view live readings information, click the **Reading** tab to get to the **Reading** page.

13: Action Settings

Actions can be configured for alarms and reports available in the xSenso. Certain alarms and reports are available in all the xSenso products whereas the output alarms are only available in the xSenso 21A2 as seen in *Table 13-1 xSenso Alarms and Reports* below.

Alarms and Reports

Table 13-1 xSenso Alarms and Reports

xSenso 2100	xSenso 21A2	xSenso 21R2
Terminal Block Power Alarm	Terminal Block Power Alarm	Terminal Block Power Alarm
Barrel Connector Power Alarm	Barrel Connector Power Alarm	Barrel Connector Power Alarm
Input 1 Alarm	Input 1 Alarm	Input 1 Alarm
Input 2 Alarm	Input 2 Alarm	Input 2 Alarm
Status Report 1	Status Report 1	Status Report 1
Status Report 2	Status Report 2	Status Report 2
	Output 1 Alarm	
	Output 2 Alarm	

Reference the appropriate action tables below for specific configuration settings for the alarms and reports listed in *Table 13-1 xSenso Alarms and Reports* above:

- *Table 13-3 Make Connection Settings*
- *Table 13-3 Make Connection Settings*
- *Table 13-4 Send Email Settings*
- *Table 13-5 FTP Put Settings*
- *Table 13-6 HTTP Post Settings*
- *Table 13-7 Control Relay SettingsT*
- *Table 13-8 SNMP Trap Settings*

Actions Available for Alarms and Reports

Table 13-2 Control Analog Output Settings

Note: *Control analog output settings are only available in the xSenso 21A2 and not available for status reports or analog output alarms.*

Contol Analog Output Settings	Description
Add an Action (drop-down menu)	Select **Control Analog Output** for the alarm. The Output will appear.

Contol Analog Output Settings (continued)	Description
Output	Select the output number from the drop-down menu. Additional Analog Output configuration fields become available if a specific output number is selected. Selecting "None" stops control of analog output and does not reset the output value.
Alarm Value	Provide the value to be asserted on the selected Analog Output when the alarm is turned on.
Normal Value	Provide the value to be asserted on the selected Analog Output when alarm is turned off.

Table 13-3 Make Connection Settings

Make Connection Settings	Description
Add an Action (drop-down menu)	Select **Make Connection** for the alarm or report. The Address field will appear. You can create up to 10 connections. Repeat entry for the fields below of each connection. There are a maximum of 10 connections for each alarm type and a total of 40 hosts under “make connection” across all alarm types.
Address	To establish a connection when the alarm is on, provide either a DNS or IP address of the remote host. Multiple connection and reporting options will appear.
Reporting	Check the types of reporting to include: ◆ Serial Number ◆ System Long Name ◆ Terminal Block ◆ Barrel Connector ◆ Analog Input 1 ◆ Analog Input 2 ◆ Analog Output 1 ◆ Analog Output 2 ◆ Relay Output 1 ◆ Relay Output 2 ***Note:*** *Analog outputs are only supported for xSenso 21A2 and relay outputs are only supported for xSenso 21R2. Your reporting selections made here will apply for all the connections you make.*
Reminder Interval	Specify how long to wait in seconds before trying to reconnect to the remote host. Blank the display field to disable reminders. If more than one Connect host is specified, connections are attempted without delay; so the single **Reminder Interval** applies to the delay between successive attempts to them all. Data will only be sent once by default.
Port	Enter the port number.
Mode	Select the mode: ◆ Sequential ◆ Simultaneous ***Note:*** *This configuration field appears when more than one connection is enabled.*
Protocol	Select the appropriate protocol: TCP, UDP, SSH, Telnet, TCP AES, UDP AES, and SSL.

Make Connection Settings (continued)	Description
SSH Username	Specify the SSH Client User for the SSH outgoing connection if the SSH protocol is selected for this connection. You may select from the drop-down menu of existing users or you may enter a new user name. This configuration field is only available if the SSH protocol is selected.
AES Encrypt Key	Enter an AES encryption key to encrypt outgoing data and select **Hexadecimal** or **Text**. This configuration field is only available if either TCP AES or UDP AES protocol is selected.
AES Decrypt Key	Enter an AES decryption key to decrypt incoming data and select **Hexadecimal** or **Text**. This configuration field is only available if either TCP AES or UDP AES protocol is selected.
Validate Certificate	Check to enable or disable validation certificate, if SSL protocol is selected. This configuration field is only available if the SSL protocol is selected. ◆ Enabling Validate Certificate requries the server to verify the remote SSL server certificate when making a connection. ◆ Disabling Validate Certificate causes the server to skip verification of the remote SSL certificate.
Credentials	Specify the name of the set of RSA and/or DSA certificates and keys to be used for the SSL connection. This configuration field is only available if the SSL protocol is selected.

Table 13-4 Send Email Settings

Send Email Settings	Description
Add an Action (drop-down menu)	Select **Send Email** for the alarm or report. Repeat entry for the fields below of each email.
Alarm Email	Select an alarm profile number which will send an email when the alarm is turned on. Multiple connection and reporting options will appear.
Normal Email	Select an alarm profile number which will send an email when the alarm is turned off. Multiple normal email configuration options will appear.
Reporting	Check the types of reporting to include: ◆ Serial Number ◆ System Long Name ◆ Terminal Block ◆ Barrel Connector ◆ Analog Input 1 ◆ Analog Input 2 ◆ Analog Output 1 (for xSenso 21A2 only) ◆ Analog Output 2 (for xSenso 21A2 only) ◆ Relay Output 1 (for xSenso 21R2 only) ◆ Relay Output 2 (for xSenso 21R2 only) ***Note:*** *Your reporting selections made here will apply for both the alarm and normal emails established.*
Alarm Message	Specify the message that would appear in the alarm email message to be sent.
Alarm Reminder Interval	Specify how long to wait in minutes after the alarm stays on before another alarm email is sent. Blank the display field to disable reminders. Email will only be sent once by default.
Normal Message	Specify the message that would appear in the normal email message to be sent.

Send Email Settings	Description
Normal Reminder Interval	Specify how long to wait in minutes after the alarm stays off before another normal email is sent. If this is a status report, a normal email is sent periodically according to the stated reminder interval. Blank the display field to disable reminders. Email will only be sent once by default.

Table 13-5 FTP Put Settings

FTP Put Settings	Description
Add an Action (drop-down menu)	Select **FTP Put** for the alarm or report. The Host field will appear. You can create up to 2 connections. Repeat entry for the fields below of each FTP Put Host.
Host	Enter the FTP server IP address or hostname to be connected to. Multiple FTP Put configuration options will appear.
Reporting	Check the types of reporting to include: ◆ Serial Number ◆ System Long Name ◆ Terminal Block ◆ Barrel Connector ◆ Analog Input 1 ◆ Analog Input 2 ◆ Analog Output 1 (for xSenso 21A2 only) ◆ Analog Output 2 (for xSenso 21A2 only) ◆ Relay Output 1 (for xSenso 21R2 only) ◆ Relay Output 2 (for xSenso 21R2 only) ***Note:*** *Your reporting selections made here will apply for all the connections you make.*
Reminder Interval	Specify how long to wait in minutes before trying to reconnect to the remote host. Blank the display field to disable reminders. If more than one Connect host is specified, connections are attempted without delay; so the single **Reminder Interval** applies to the delay between successive attempts to them all. Data will only be sent once by default.
Port	Enter the port number which FTP server is listening to.
Mode	Select the mode: ◆ Sequential ◆ Simultaneous ***Note:*** *This configuration field appears when more than one connection is enabled.*
Filename	Enter the file name to be used to upload to remote FTP server. If file already exists, new data will be appended to remote file.
Protocol	Select the appropriate protocol to connect to the FTP server: FTP or FTPS.
Username	Specify the Username for logging on to the FTP server. IF FTP server does not require authentication, use anonymous.
Password	Specify the Password for logging on to the FTP server. IF FTP server does not require authentication, a common practice is to use user's email address.

Table 13-6 HTTP Post Settings

HTTP Post Settings	Description
Add an Action (drop-down menu)	Select **HTTP Post** for the alarm or report. The Host field will appear. You can create up to 2 connections. Repeat entry for the fields below of each HTTP Post Host.
Host	Enter the HTTP server IP address or hostname to be connected to. Multiple HTTP Post configuration options will appear.
Reporting	Check the types of reporting to include: ◆ Serial Number ◆ System Long Name ◆ Terminal Block ◆ Barrel Connector ◆ Analog Input 1 ◆ Analog Input 2 ◆ Analog Output 1 (for xSenso 21A2 only) ◆ Analog Output 2 (for xSenso 21A2 only) ◆ Relay Output 1 (for xSenso 21R2 only) ◆ Relay Output 2 (for xSenso 21R2 only) ***Note:*** *Your reporting selections made here will apply for all the connections you make.*
Reminder Interval	Specify how long to wait in minutes before trying to reconnect to the remote host. Blank the display field to disable reminders. If more than one Connect host is specified, connections are attempted without delay; so the single **Reminder Interval** applies to the delay between successive attempts to them all. Data will only be sent once by default.
Port	Enter the port number which HTTP server is listening to.
URL	Enter the URL to be used to post to remote HTTP server.
Protocol	Select the appropriate protocol to connect to the HTTP server: HTTP or HTTPS.
Username	Specify the Username for logging on to the HTTP server. Both Basic and Digest Authentications are supported. If HTTP server does not require authentication, leave blank.
Password	Specify the Password for logging on to the HTTP server. If HTTP server does not require authentication, leave blank.

Table 13-7 Control Relay Settings

Normally Open Port is closed to Common and Normally Closed Port is open/disconnected from Common when relay is energized/turned on. Normally Open Port is open/disconnected from Common and Normally Closed Port is closed to Common when relay is de-energized/turned off.

Note: *Control relay settings are only available in the xSenso 21R2 and is not available for status reports.*

Control Relay Settings	Description
Add an Action (drop-down menu)	Select **Control Relay** for the alarm. The **Alarm Energize** field will appear.
Alarm Energize	Select either **Relay 1** or **Relay 2** to turn on when this is alarm is turned on. Selecting **None** will cause the alarm state to have no effect on either relay.

Table 13-8 SNMP Trap Settings

SNMP Settings	Description
Add an Action (drop-down menu)	Select **SNMP Trap** for the alarm or report.
State	Check to enable or disable: ◆ Introduce additional SNMP Trap configuration fields when enabled.
Reporting	Check the types of reporting to include: ◆ Serial Number ◆ System Long Name ◆ Terminal Block ◆ Barrel Connector ◆ Analog Input 1 ◆ Analog Input 2 ◆ Analog Output 1 (for xSenso 21A2 only) ◆ Analog Output 2 (for xSenso 21A2 only) ◆ Relay Output 1 (for xSenso 21R2 only) ◆ Relay Output 2 (for xSenso 21R2 only) ***Note:*** *Your reporting selections made here will apply for all the connections you make.*
Reminder Interval	Specify how long to wait in minutes before an SNMP Trap is sent to the remote host. Blank the display field to disable reminders. Data will only be sent once by default.

To Configure Terminal Block Power Alarm Settings

Using Web Manager

◆ To configure terminal block power alarm, go to the **Setup** tab/page, click **Action** in the menu, and select **Terminal Block Power Alarm** from the drop-down menu.

Using the CLI

◆ To enter the terminal block power alarm command level: `enable -> config -> action -> terminal block power alarm`

Using XML

◆ Include in your file: `<configgroup name = "action" instance = "Terminal Block Power Alarm">`

To Configure Barrel Connector Power Alarm Settings

Using Web Manager

◆ To configure barrel connector power alarm, go to the **Setup** tab/page, click **Action** in the menu, and select **Barrel Connector Power Alarm** from the drop-down menu.

Using the CLI

◆ To enter the barrel connector power alarm command level: `enable -> config -> action -> barrel connector block power alarm`

Using XML

- Include in your file: `<configgroup name = "action" instance = "Barrel Connector Power Alarm">`

To Configure Input 1 and 2 Alarm Settings

Using Web Manager

- To configure input 1 and input 2 alarms, go to the **Setup** tab/page, click **Action** in the menu, and select Input (1 or 2) Alarm from the drop-down menu.

Using the CLI

- To enter the input (1 or 2) alarm command level: `enable -> config -> action -> input 1 alarm`

Using XML

- Include in your file: `<configgroup name = "action" instance = "Input 1 Alarm">`

To Configure Status Reports 1 and 2 Settings

Using Web Manager

- To configure status reports 1 or 2, go to the **Setup** tab/page, click **Action** in the menu, and select **Status Report (1 or 2)** from the drop-down menu.

Using the CLI

- To enter the Report (1 or 2) command level: `enable -> config -> action -> status report 1`

Using XML

- Include in your file: `<configgroup name = "action" instance = "Status Report 1">`

To Configure Output 1 and 2 Alarm Settings

Using Web Manager

- To configure output 1 or output 2 alarms, go to the **Setup** tab/page, click **Action** in the menu, and select **Output (1 or 2) Alarm** from the drop-down menu.

Using the CLI

- To enter the report (1 or 2) command level: `enable -> config -> action -> output 1 alarm`

Using XML

- Include in your file: `<configgroup name = "action" instance = "Output 1 Alarm">`

14: Tunnel and Modbus Settings

The xSenso 2100, xSenso 21A2 and xSenso 21R2 have two tunnels through which you may view statistics or configure the Accept Mode. The Modbus configuration page allows configuration of Modbus servers listening on the TCP ports.

Tunnel Settings

Tunneling parameters are configured using the **Tunnel** menu and submenus. The Tunnel settings allow you to configure how the Network tunneling operates.

Note: *The following section describes the steps to view and configure Tunnel 1 settings; these steps apply to other tunnel instances of the device.*

Accept Mode

In Accept Mode, the xSenso listens (waits) for incoming connections from the network. A remote node on the network initiates the connection.

The configurable local port is the port the remote device connects to for this connection.

Table 14-1 Tunnel Accept Mode Settings

Tunnel Accept Mode Settings	Description
Mode	Set the method used to start a tunnel in Accept mode. Choices are: ◆ **Disable** = do not accept an incoming connection. ◆ **Always** = accept an incoming connection (*default*).
Local Port	Set the port number for use as the network local port. The default local port number: ◆ Tunnel 1 : 10001 ◆ Tunnel 2 : 10002
Protocol	Select the protocol type for use with Accept Mode: ◆ SSH ◆ SSL ◆ TCP (default protocol) ◆ TCP AES ◆ Telnet
Credentials	Specifies the name of the set of RSA and/or DSA certificates and keys to be used for an SSL connection.
AES Encrypt Key	Specify the text or hexadecimal advanced encryption standard (AES) key for encrypting outgoing data for a TCP AES connection.
AES Decrypt Key	Specify the text or hexadecimal AES key for decrypting incoming data for a TCP AES connection.

Tunnel Accept Mode Settings (continued)	Description
TCP Keep Alive	Enter the time, in milliseconds, the xSenso waits during a silent TCP connection before checking if the currently connected network device is still on the network. If the unit gets no response after 1 attempt, it drops the connection. Enter 0 to disable.
Block Network	Set whether Block Network is enabled for debugging purposes. Choices are: ◆ **Enabled** = if Enabled, incoming characters from the network will not be processed. Instead, they will be buffered and will eventually flow off the network side. ◆ **Disabled** = this is the default setting; incoming characters from the network will be processed. Any buffered characters are sent first.
Password	Enter a password. This password can be up to 31 characters in length and must contain only alphanumeric characters and punctuation. When set, clients must send the correct password string to the unit within 30 seconds from opening network connection in order to enable data transmission. The password sent to the unit must be terminated with one of the following: ◆ 0A (Line Feed) ◆ 00 (Null) ◆ 0D 0A (Carriage Return/Line Feed) ◆ 0D 00 (Carriage Return/Null) If, **Prompt for Password** is set to **Enabled** and a password is provided, the user will be prompted for the password upon connection.
Prompt for Password	Select **Enabled** or **Disabled** (to enable or disable). This option will only appear if a password is specified above.
Email on Connect	Select an email profile number to which an email notification will be sent upon the establishment of an accept mode tunnel.
Email on Disconnect	Select an email profile number to which an email notification will be sent upon the disconnection of an accept mode tunnel.

To Configure Tunnel Accept Mode Settings

Using Web Manager

- To configure the Accept Mode for a specific tunnel, go to the **Setup** tab/page, click **Tunnel** in the menu and select **Tunnel 1 -> Accept Mode**.

Using the CLI

- To enter Tunnel 1 Accept Mode command level: `enable -> tunnel 1 -> accept`

Using XML

- Include in your file: `<configgroup name="tunnel accept" instance="1">`

Modbus Settings

The Modbus server, if enabled, is active on TCP port 502. If present, the additional TCP port is also used. Modbus TCP parameters are configured using the Modbus menu and submenus under Admin.

Table 14-2 Modbus Settings

Modbus Settings	Description
TCP Server State	Click to turn the TCP server state **On** or **Off**. The TCP port is 502.
Additional TCP Server Port	If present, the Modbus server also listens on this TCP port.
Response Timeout	Enter the amount of time, in milliseconds, where the Modbus server will timeout in lieu of a response.
RSS Trace Input	Click to turn RSS trace input **On** or **Off**. If RSS trace input is enabled, each PDU received on the Modbus serial line creates a non-persistent descriptive item in the RSS feed.

To Configure Modbus Settings

Using Web Manager

- To configure the Modbus, go to the **Admin** tab/page and click **Modbus** in the menu.

Using the CLI

- To enter the Modbus command level: `enable -> config -> modbus`

Using XML

- Include in your file: `<configgroup name="modbus">`

Supported Modbus TCP/IP Functions and Registers

Table 14-3 0xxxx Read/Write Coils (Function Codes 1, 5 and 15)

Device Address	Modbus Address	Description
00001	0x0000	0: Relay 1 Off, 1: Relay 1 On
00002	0x0001	0: Relay 2 Off, 1: Relay 2 On
00003	0x0002	Write 1 to reset latched Relay 1
00004	0x0003	Write 1 to reset latched Relay 2

Table 14-4 3xxxx Read Only Registers (Function Codes 4 and 23)

Device Address	Modbus Address	Description
30001	0x0000	Input 1 high word of float (Float AB CD)
30002	0x0001	Input 1 low word of float (Float AB CD)
30003	0x0002	Input 2 high word of float (Float AB CD)
30004	0x0003	Input 2 low word of float (Float AB CD)

Table 14-5 4xxxx Read/Write Holding Registers (Function Codes 3, 16 and 23)

Device Address	Modbus Address	Description
40001	0x0000	Output 1 high word of float (Float AB CD) -1 will be returned if voltage output is shorted. -2 will be returned if current output is opened.
40002	0x0001	Output 1 low word of float (Float AB CD)
40003	0x0002	Output 2 high word of float (Float AB CD)-1 will be returned if voltage output is shorted. -2 will be returned if current output is opened.
40004	0x0003	Output 2 low word of float (Float AB CD)

Note: *The device will respond to any unit identifier less than 247 since each unit is uniquely identified by its IP address already.*

15: Services Settings

DNS Settings

This section describes the active run-time settings for the domain name system (DNS) protocol. The primary and secondary DNS addresses come from the active interface. The static addresses from the Network Interface configuration settings may be overridden by DHCP.

Note: *The blue text in the XML command strings of this chapter are to be replaced with a user-specified name.*

Table 15-1 DNS Settings

Setting / Field	Description
Lookup	Perform one of the following: ◆ Enter an IP address, and perform a reverse Lookup to locate the hostname for that IP address ◆ Enter a hostname, and perform a forward Lookup to locate the corresponding IP address

To View or Configure DNS Settings:

Using Web Manager

- To view DNS current status, go to the **Admin** tab/page and click **DNS** in the menu.
- To lookup DNS name or IP address, go to the **Admin** tab/page and click **DNS** in the menu to access the **Lookup** field.

Note: *To configure DNS for cases where it is not supplied by a protocol, o to the* **Admin** *tab/page, click* ***Network*** *in the menu and select* ***Interface -> Configuration****.*

Using the CLI

- To enter the DNS command level: `enable -> dns`

Using XML

- Include in your file: `<configgroup name="interface" instance="eth0">`

FTP Settings

The FTP protocol can be used to upload and download user files, and upgrade the xSenso firmware. A configurable option is provided to enable or disable access via this protocol.

Table 15-2 **FTP Settings**

FTP Settings	Description
State	Select to enable or disable the FTP server: ◆ **Enabled** (default) ◆ **Disabled**

To Configure FTP Settings

Using Web Manager

- To configure FTP, go to the **Admin** tab/page and click **FTP** in the menu.

Using the CLI

- To enter the FTP command level: `enable -> config -> ftp`

Using XML

- Include in your file: `<configgroup name="ftp server">`

Syslog Settings

The Syslog information shows the current configuration and statistics of the syslog. Here you can configure the syslog host and the severity of the events to log.

Note: *The system log is always saved to local storage, but it is not retained through reboots unless diagnostics logging to the filesystem is enabled. Saving the system log to a server that supports remote logging services (see RFC 3164) allows the administrator to save the complete system log history. The default port is 514.*

Table 15-3 Syslog Settings

Syslog Settings	Description
State	Select to enable or disable the syslog: ◆ **Enabled** ◆ **Disabled** (default)
Host	Enter the IP address of the remote server to which system logs are sent for storage.
Remote Port	Enter the number of the port on the remote server that supports logging services. The default is 514.

Syslog Settings (continued)	Description
Severity Log Level	Specify the minimum level of system message the should log. This setting applies to all syslog facilities. The drop-down list in the Web Manager is in descending order of severity (e.g., Emergency is more severe than Alert.)

To View or Configure Syslog Settings:

Using Web Manager

- To configure the Syslog, go to the **Admin** tab/page and click **Syslog** in the menu.

Using the CLI

- To enter the Syslog command level: `enable -> config -> syslog`

Using XML

- Include in your file: `<configgroup name="syslog">`

HTTP Settings

Hypertext Transfer Protocol (HTTP) is the transport protocol for communicating hypertext documents on the Internet. HTTP defines how messages are formatted and transmitted. It also defines the actions web servers and browsers should take in response to different commands. HTTP Authentication enables the requirement of usernames and passwords for access to the device.

Table 15-4 **HTTP Settings**

HTTP Settings	Description
State	Select to enable or disable the HTTP server: ◆ **Enabled** (default) ◆ **Disabled**
Port	Enter the port for the HTTP server to use. The default is **80**.
Secure Port	Enter the port for the HTTPS server to use. The default is **443**. The HTTP server only listens on the **HTTPS Port** when an SSL certificate is configured.
Secure Protocols	Select to enable or disable the following protocols: ◆ **SSL3** = Secure Sockets Layer version 3 ◆ **TLS1.0** = Transport Layer Security version 1.0. TLS 1.0 is the successor of SSL3 as defined by the IETF. ◆ **TLS1.1** = Transport Layer Security version 1.1 The protocols are enabled by default. ***Note:*** *A server certificate and associated private key need to be installed in the* **SSL** *configuration section to use* **HTTPS**.
Secure Credentials	Specify the name of the set of RSA and/or DSA certificates and keys to be used for the secure connection.

HTTP Settings (continued)	Description
Max Timeout	Enter the maximum time for the HTTP server to wait when receiving a request. This prevents Denial-of-Service (DoS) attacks. The default is **10** seconds.
Max Bytes	Enter the maximum number of bytes the HTTP server accepts when receiving a request. The default is **40** KB (this prevents DoS attacks). ***Note:*** You may need to increase this number in some cases where the browser is sending data aggressively within TCP windows size limit, when file (including firmware upgrade) is uploaded from webpage.
Logging State	Select to enable or disable HTTP server logging: ◆ **Enabled** (default) ◆ **Disabled**
Max Log Entries	Set the maximum number of HTTP server log entries. Only the last **Max Log Entries** are cached and viewable.
Log Format	Set the log format string for the HTTP server. Follow these **Log Format** rules: ◆ **%a** - remote IP address (could be a proxy) ◆ **%b** - bytes sent excluding headers ◆ **%B** - bytes sent excluding headers (0 = '-') ◆ **%h** - remote host (same as '%a') ◆ **%{h}i** - header contents from request (h = header string) ◆ **%m** - request method ◆ **%p** - ephemeral local port value used for request ◆ **%q** - query string (prepend with '?' or empty '-') ◆ **%t** - timestamp HH:MM:SS (same as Apache '%(%H:%M:%S)t' or '%(%T)t') ◆ **%u** - remote user (could be bogus for 401 status) ◆ **%U** - URL path info ◆ **%r** - first line of request (same as '%m %U%q <version>') ◆ **%s** - return status
Authentication Timeout	The timeout period applies if the selected authentication type is either **Digest** or **SSL/Digest**. After this period of inactivity, the client must authenticate again.

To Configure HTTP Settings

Using Web Manager

- To configure HTTP settings, o to the **Admin** tab/page, click **HTTP** in the menu and select **Configuration**.
- To view HTTP statistics, click **HTTP** in the menu and select **Statistics**.

Using the CLI

- To enter the HTTP command level: `enable -> config -> http`

Using XML

- Include in your file: `<configgroup name="http server">`

Table 15-5 **HTTP Authentication Settings**

HTTP Authentication Settings	Description
URI	Enter the Uniform Resource Identifier (URI). ***Note:*** *The URI must begin with '/' to refer to the filesystem.*
Auth Type	Select the authentication type: ◆ **None** = no authentication is necessary. ◆ **Basic** = encodes passwords using Base64. ◆ **Digest** = encodes passwords using MD5. ◆ **SSL** = can only be accessed over SSL (no password is required). ◆ **SSL/Basic** = is accessible only over SSL and encodes passwords using Base64. ◆ **SSL/Digest** = is accessible only over SSL and encodes passwords using MD5. ***Note:*** *When changing the parameters of Digest or SSL Digest authentication, it is often best to close and reopen the browser to ensure it does not attempt to use cached authentication information.*

To Configure HTTP Authentication

Using Web Manager

- To configure HTTP Authentication, o to the **Admin** tab/page, click **HTTP** in the menu and select **Authentication**.

Using the CLI

- To enter the HTTP command level: `enable -> config -> http`

Using XML

- Include in your file: `<configgroup name="http authentication uri" instance="`uri name`">`

RSS Settings

Really Simple Syndication (RSS) (sometimes referred to as Rich Site Summary) is a method of feeding online content to Web users. Instead of actively searching for configuration changes, RSS feeds permit viewing only relevant and new information regarding changes made via an RSS publisher. The RSS feeds may also be stored to the file system cfg_log.txt file.

Table 15-6 **RSS Settings**

RSS Settings	Description
RSS Feed	Select **On** or **Off** for RSS feeds to an RSS publisher. The default setting is off.
Persistent	Select **On** or **Off** for RSS feed to be written to a file (cfg_log.txt) and to be available across reboots. The default setting is off.
Max Entries	Set the maximum number of log entries. Only the last **Max Entries** are cached and viewable.
View	Click the button to view RSS feeds.

RSS Settings	Description
Clear	Click the button to clear RSS feed data.

To Configure RSS Settings

Using Web Manager

- To configure RSS, go to the **Admin** tab/page and click **RSS** in the menu.

Using the CLI

- To enter the RSS command level: `enable -> config -> rss`

Using XML

- Include in your file: `<configgroup name="rss">`

SNMP Settings

Simple Network management Protocol (SNMP) settings may be viewed and configured in this section.

Table 15-7 SNMP Settings

RSS Settings	Description
State	Select to enable or disable the SNMP agent state.
Version	Select the SNMP version used by the SNMP agent.
Read Community	Specify the read community used by the agent (defaults to public community).
Write Community	Specify the write community used by the agent (defaults to private community).
Engine ID	Show SNMPv3 Engine ID, if SNMPv3 version is selected.
Username	Enter the SNMPv3 Username if SNMPv3 version and authentication are selected.
Security	Select whether authentication and/or privacy should be used by the agent, if SNMPv3 version and authentication are selected.
Authentication Protocol	Select which authentication protocol should be used by the agent, if SNMPv3 version and authentication are selected.
Authentication Password	Enter the authentication password to be used by the agent, if SNMPv3 version and authentication are selected. Must be at least eight (8) characters.
Privacy Protocol	Select the privacy encryption method to be used by the agent, if SNMPv3, authentication and privacy are selected.
Privacy Password	Enter the password to be used for privacy encryption by the agent, if SNMPv3 version, authentication and privacy are selected. Must be at least eight (8) characters.
System Contact	Specify the system contact.
System Name	Update the system name, as necessary. The default system name is xSenso 2100, xSenso 21A2 or xSenso 21R2, depending the xSenso model.

RSS Settings	Description
System Description	Update the system description, as necessary. The default system information includes the manufacturer name, xSenso model name, version and the serial number of the device.
System Location	Specify a system location for the SNMP setting.
Lantronix MIB File	Click the Lantronix MIB file name to save and load it into the MIB browser and trap receiver.
xSenso MIB File	Click the xSenso MIB file name to save and load it into the MIB browser and trap receiver.
Primary Destination	Enter the **primary SNMP trap receiver** for the enabled SNMP agent. This is either an IP address or a hostname.
Secondary Destination	Enter the **secondary SNMP trap receiver** for the enabled SNMP agent. This is either an IP address or a hostname.

To Configure SNMP Settings

Using Web Manager

- To configure SNMP, go to the **Admin** tab/page and click **SNMP** in the menu.

Using the CLI

- To enter the SNMP command level: `enable -> config -> snmp`

Using XML

- Include in your file: `<configgroup name="snmp">`

SMTP Settings

Table 15-8 SMTP Network Stack Settings

Protocol Stack SMTP Settings	Description
From Address	Enter the From Address here. This is an email address and is required. If you wish to direct oubtound email messages through a mail server, put your client email address here.
Server Address	Enter the Server Address to direct outbound email messages through a mail server.
Server Port	Enter the SMTP server port number. The default is 25
Username	Enter a Username to direct outbound email messages through a mail server.
Password	Enter a Password to direct outbound email messages through a mail server.
Overriding Domain	Enter the domain name to override the current domain name in EHLO (Extended Hello).

To Configure SMTP Network Stack Settings

Using Web Manager

- To configure SMTP protocol settings, go to the **Admin** tab/page and click **SMTP** in the menu.

Using the CLI

- To enter the command level: `enable -> config -> smtp`

Using XML

- Include in your file: `<configgroup name="smtp">`

16: Security Settings

The xSenso device supports Secure Shell (SSH) and Secure Sockets Layer (SSL). SSH is a network protocol for securely accessing a remote device. SSH provides a secure, encrypted communication channel between two hosts over a network. It provides authentication and message integrity services.

Secure Sockets Layer (SSL) is a protocol that manages data transmission security over the Internet. It uses digital certificates for authentication and cryptography against eavesdropping and tampering. It provides encryption and message integrity services. SSL is widely used for secure communication to a web server. SSL uses certificates and private keys.

Note: *The device supports SSLv3 and its successors, TLS1.0 and TLS1.1. An incoming SSLv2 connection attempt is answered with an SSLv3 response. If the initiator also supports SSLv3, SSLv3 handles the rest of the connection.*

SSH Settings

SSH is a network protocol for securely accessing a remote device over an encrypted channel. This protocol manages the security of internet data transmission between two hosts over a network by providing encryption, authentication, and message integrity services.

Two instances require configuration: when the xSenso is the SSH server and when it is an SSH client. The SSH server is used by the CLI (Command Mode) and for tunneling in Accept Mode. The SSH client is for Action Connect Mode.

To configure the xSenso as an SSH server, there are two requirements:

- **Defined Host Keys:** both private and public keys are required. These keys are used for the Diffie-Hellman key exchange (used for the underlying encryption protocol).
- **Defined Users**: these users are permitted to connect to the xSenso SSH server.

SSH Server Host Keys

The SSH Server Host Keys are used by all applications that play the role of an SSH Server. Specifically Tunneling in Accept Mode. These keys can be created elsewhere and uploaded to the device or automatically generated on the device.

If uploading existing keys, take care to ensure the Private Key will not be compromised in transit. This implies the data is uploaded over some kind of secure private network.

Note: *Some SSH Clients require RSA Host Keys to be at least 1024 bits in size.*

Table 16-1 SSH Server Host Keys

RSS Settings	Description
Private Key	Enter the path and name of the existing private key you want to upload. In WebManager, you can also browse to the private key to be uploaded. Be sure the private key will not be compromised in transit. This implies the data is uploaded over some kind of secure private network.

RSS Settings (continued)	Description
Public Key	Enter the path and name of the existing public key you want to upload. In WebManager, you can also browse to the public key to be uploaded.
Key Type	Select a key type to use for the new key: ◆ RSA ◆ DSA
Bit Size	Select a bit length for the new key: ◆ 512 ◆ 768 ◆ 1024

Note: *SSH Keys from other programs may be converted to the required format. Use Open SSH to perform the conversion.*

SSH Client Known Hosts

The SSH Client Known Hosts are used by all applications that play the role of an SSH Client. Specifically in Action Connect Mode. Configuring these public keys are optional but if they exist another layer of security is offered which helps prevent Man-in-the-Middle (MITM) attacks.

Table 16-2 SSH Client Known Hosts

RSS Settings	Description
Server	Specify either a DNS Hostname or IP Address when adding public host keys for a Server. This Server name should match the name used as the Remote Address in Action Connect Mode.
Public RSA Key	Enter the path and name of the existing public RSA key you want to use with this user. In WebManager, you can also browse to the public RSA key to be uploaded. If authentication is successful with the key, no password is required.
Public DSA Key	Enter the path and name of the existing public DSA key you want to use with this user. In WebManager, you can also browse to the public DSA key to be uploaded.If authentication is successful with the key, no password is required.

Note: *These settings are not required for communication. They protect against Man-In-The-Middle (MITM) attacks.*

SSH Server Authorized Users

The SSH Server Authorized Users are used by all applications that play the role of an SSH Server and specifically Tunnel Accept. Every user account must have a Password.

The user's Public Keys are optional and only necessary if public key authentication is wanted. Using public key authentication will allow a connection to be made without the password being asked at that time.

Note: *When uploading the security keys, ensure the keys are not compromised in transit.*

Table 16-3 SSH Server Authorized Users

RSS Settings	Description
Username	Enter a new username or edit an existing one.
Password	Enter a new password or edit an existing one.
Public RSA Key	Enter the path and name of the existing public RSA key you want to use with this user. In WebManager, you can also browse to the public RSA key to be uploaded. If authentication is successful with the key, no password is required.
Public DSA Key	Enter the path and name of the existing public DSA key you want to use with this user. In WebManager, you can also browse to the public DSA key to be uploaded.If authentication is successful with the key, no password is required.

SSH Client Users

The SSH Client Users are used by all applications that play the role of an SSH Client. Specifically Action Connect Mode. To configure the xSenso as an SSH client, an SSH client user must be both configured and also exist on the remote SSH server.

At the very least, a Password or Key Pair must be configured for a user. The keys for public key authentication can be created elsewhere and uploaded to the device or automatically generated on the device.

If uploading existing Keys, take care to ensure the Private Key will not be compromised in transit. This implies the data is uploaded over some kind of secure private network.

The default Remote Command is '<Default login shell>' which tells the SSH Server to execute a remote shell upon connection. This can be changed to anything the SSH Server on the remote host can execute.

Note: *If you are providing a key by uploading a file, make sure that the key is not password protected.*

Table 16-4 SSH Client Users

RSS Settings	Description
Username	Enter the name that the device uses to connect to an SSH server.
Password	Enter the password associated with the username.
Remote Command	Enter the command that can be executed remotely. Default is shell, which tells the SSH server to execute a remote shell upon connection. This command can be changed to anything the remote host can perform.
Private Key	Enter the path and name of the existing private key you want to upload. In WebManager, you can also browse to the private key to be uploaded. Be sure the private key will not be compromised in transit. This implies the data is uploaded over some kind of secure private network.
Public Key	Enter the path and name of the existing public key you want to upload. In WebManager, you can also browse to the public key to be uploaded.
Key Type	Select a bit length for the key: ◆ **RSA** ◆ **DSA**

RSS Settings (continued)	Description
Bit Size	Select the bit length of the new key: ◆ **512** ◆ **768** ◆ **1024** Using a larger Bit Size takes more time to generate the key. Approximate times are: ◆ **1 second for a 512 bit RSA key** ◆ **1 second for a 768 bit RSA key** ◆ **1 second for a 1024 bit RSA key** ◆ **2 seconds for a 512 bit DSA key** ◆ **2 seconds for a 768 bit DSA key** ◆ **20 seconds for a 1024 bit DSA key** ***Note:*** *Some SSH clients require RSA host keys to be at least 1024 bits long. This device generates keys up to 2048 bits long.*

To Configure SSH Settings

Using Web Manager

- To configure SSH, go to the **Admin** tab/page and click **SSH** in the menu.

Using the CLI

- To enter the SSH command level: `enable -> ssh`

Using XML

- Include in your file: `<configgroup name="ssh server">`
  and
  `<configgroup name="ssh client">`

SSL Settings

Secure Sockets Layer (SSL) is a protocol for managing the security of data transmission over the Internet. It provides encryption, authentication, and message integrity services. SSL is widely used for secure communication to a web server.

Certificate/Private key combinations can be obtained from an external Certificate Authority (CA) and uploaded into the unit. Self-signed certificates with associated private key can be generated by the device server itself.

Note: *The blue text in the XML command strings of this chapter are to be replaced with a user-specified name.*

Certificate and Key Generation

The xSenso can generate self signed certificates and their corresponding keys. This can be done for both the rsa and dsa certificate formats. Certificates can be identified on the xSenso by a name provided at generation time.

Table 16-5 Certificate and Key Generation Settings

Certificate Generation Settings	Description
Country (2 Letter Code)	Enter the 2-letter country code to be assigned to the new self-signed certificate. Examples: US for United States and CA for Canada
State/Province	Enter the state or province to be assigned to the new self-signed certificate.
Locality (City)	Enter the city or locality to be assigned to the new self-signed certificate.
Organization	Enter the organization to be associated with the new self-signed certificate.
Organization Unit	Enter the organizational unit to be associated with the new self-signed certificate.
Common Name	Enter the common name to be associated with the new self signed certificate, preferrably matching the host name or the ip address of the device, whichever will be the intended access approach. This is a required field.
Expires	Enter the expiration date, in mm/dd/yyyy format, for the new self-signed certificate. Example: An expiration date of May 9, 2012 is entered as 05/09/2012.
Key length	Select the bit size of the new self-signed certificate. Choices are: ◆ 512 bits ◆ 768 bits ◆ 1024 bits ◆ 2048 bits The larger the bit size, the longer it takes to generate the key.
Type	Select the type of key: ◆ **RSA** = Public-Key Cryptography algorithm based on large prime numbers, invented by Rivest Shamir and Adleman. Used for encryption and signing. ◆ **DSA** = Digital Signature Algorithm also based on large prime numbers, but can only be used for signing. Developed by the US government to avoid the patents on RSA.

To Create a New Credential

Using Web Manager

- To create a new credential, o to the **Admin** tab/page, click **SSL** in the menu and select **Credentials**.

Using the CLI

- To enter the SSL command level: `enable -> ssl`
- To enter the Credentials command level: `enable -> ssl -> credentials`

Using XML

- Not applicable.

Certificate Upload Settings

SSL certificates identify the xSenso to peers. Certificate and key pairs can be uploaded to the xSenso through either the CLI or XML import mechanisms. Certificates can be identified on the xSenso by a name provided at upload time.

Table 16-6 Upload Certificate Settings

Upload Certificate Settings	Description
New Certificate	SSL certificate to be uploaded. RSA or DSA certificates are allowed. The format of the certificate must be PEM. It must start with "`-----BEGIN CERTIFICATE-----`" and end with "`-----END CERTIFICATE-----`". Some Certificate Authorities add comments before and/or after these lines. Those need to be deleted before upload.
New Private Key	The key needs to belong to the certificate entered above. The format of the file must be PEM. It must start with "`-----BEGIN RSA PRIVATE KEY-----`" and end with "`-----END RSA PRIVATE KEY-----`". Read DSA instead of RSA in case of a DSA key. Some Certificate Authorities add comments before and/or after these lines. Those need to be deleted before upload.

To Configure an Existing SSL Credential

Using Web Manager

- To configure an existing SSL Credential, o to the **Admin** tab/page, click **SSL** in the menu and select **Credentials**.

Using the CLI

- To enter the SSL command level: `enable -> ssl`
- To enter the Credential command level: `enable -> ssl -> credentials`

Using XML

- Include in your file:

  `<configgroup name="ssl">`

  and `<configitem name="credentials" instance="name">`

  and `<value name="RSA certificate"/>` or `<value name="DSA certificate"/>`

Trusted Authorities

One or more authority certificates are needed to verify a peer's identity. These certificates do not require a private key. SSL certificate for HTTPS and FTPS connections under Action must be uploaded here.

Table 16-7 Trusted Authority Settings

Trusted Authorities Settings	Description
Authority	SSL authority certificate. RSA or DSA certificates are allowed. The format of the authority certificate can be PEM or PKCS7. PEM files must start with "`-----BEGIN CERTIFICATE-----`" and end with "`-----END CERTIFICATE-----`". Some Certificate Authorities add comments before and/or after these lines. Those need to be deleted before upload.
Delete	Click the **Delete** button beside a specific certificate authority to delete it.

To Upload an Authority Certificate

Using Web Manager

- To upload an Authority Certificate, o to the **Admin** tab/page, click **SSL** in the menu and select **Trusted Authorities**.

Using the CLI

- To enter the SSL command level: `enable -> ssl`
- To enter the Trusted Authorities command level: `enable -> ssl -> trusted authorities`

Using XML

- Include in your file:

  `<configgroup name="ssl">`

  and `<configitem name="trusted authority" instance ="1">`

  and `<configitem name="intermediate authority" instance="1">`

17: Maintenance and Diagnostics Settings

Filesystem Settings

Use the file system to list, view, add, remove, and transfer files. The xSenso uses a flash file system to store files.

File Display

It is possible to view the list of existing files, and to view their contents in the ASCII or hexadecimal formats.

Table 17-1 File Display Settings

File Display Commands	Description
ls	Displays a list of files on the xSenso, and their respective sizes.
cat	Displays the specified file in ASCII format.
dump	Displays the specified file in a combination of hexadecimal and ASCII formats.
pwd	Print working directory.
cd	Change directories.
show tree	Display file/directory tree.

To Display Files

Using Web Manager

- To view existing files and file contents, go to the **Admin** tab/page, click **FIlesystem** in the menu and select **Browse**.

Using the CLI

- To enter the Filesystem command level: `enable -> filesystem`

Using XML

- Not applicable.

File Modification

The xSenso allows for the creation and removal of files on its filesystem.

Table 17-2 File Modification Settings

File Modification Commands	Description
rm	Removes the specified file from the file system.
touch	Creates the specified file as an empty file.
cp	Creates a copy of a file.
mkdir	Creates a directory on the file system.
rmdir	Removes a directory from the file system.
format	Format the file system and remove all data.

File Transfer

Files can be transferred to and from the xSenso via the TFTP protocol. This can be useful for saving and restoring XML configuration files. Files can also be uploaded via HTTP.

Table 17-3 File Transfer Settings

File Transfer Settings	Description
Create	Browse to location of the file to be created.
Upload File	Browse to location of the file to be uploaded.
Copy File	Enter the source and destination for file to be copied.
Move	Enter the source and destination for file to be moved.
Action	Select the action that is to be performed via TFTP: ◆ **Get** = a “get” command will be executed to store a file locally. ◆ **Put** = a “put” command will be executed to send a file to a remote location.
Local File	Enter the name of the local file on which the specified “get” or “put” action is to be performed.
Remote File	Enter the name of the file at the remote location that is to be stored locally (“get’) or externally (“put”).
Host	Enter the IP address or name of the host involved in this operation.
Port	Enter the number of the port involved in TFTP operations.

To Transfer or Modify Filesystem Files

Using Web Manager

- To create a new file or directory, upload an existing file, copy or move a file, o to the **Admin** tab/page, click **Filesystem** in the menu and select **Browse**.

Using the CLI

- To enter the Filesystem command level: `enable -> filesystem`

Using XML

- Not applicable.

Protocol Stack Settings

There are various low level network stack specific items that are available for configuration. This includes settings related to IP, ICMP, and ARP, which are described in the sections below.

IP Settings

Table 17-4 **IP Network Stack Settings**

Protocol Stack IP Settings	Description
IP Time to Live	This value typically fills the Time To Live in the IP header. Enter the number of hops to be transmitted before the packet is discarded.
Multicast Time to Live	This value fills the Time To Live in any multicast IP header. Normally this value will be one so the packet will be blocked at the first router. It is the number of hops allowed before a Multicast packet is discarded. Enter the value to be greater than one to intentionally propagate multicast packets to additional routers.

To Configure IP Network Stack Settings

Using Web Manager

- To configure IP protocol settings, go to the **Admin** tab/page, click **Protocol Stack** in the menu and select **IP**.

Using the CLI

- To enter the command level: `enable -> config -> ip`

Using XML

- Include in your file: `<configgroup name="ip">`

ICMP Settings

Table 17-5 ICMP Network Stack Settings

Protocol Stack ICMP Settings	Description
State	The State selection is used to turn on/off processing of ICMP messages. This includes both incoming and outgoing messages. Choose **Enabled** or **Disabled**.

To Configure ICMP Network Stack Settings

Using Web Manager

- To configure ICMP protocol settings, go to the **Admin** tab/page, click **Protocol Stack** in the menu and select **ICMP**.

Using the CLI

- To enter the command level: `enable -> config -> icmp`

Using XML

- Include in your file: `<configgroup name="icmp">`

ARP Settings

Table 17-6 ARP Network Stack Settings

Protocol Stack ARP Settings	Description
IP Address	Enter the IP address to add to the ARP cache.
MAC Address	Enter the MAC address to add to the ARP cache.
Remove	Click the **Remove** link beside a specific address to remove it.
Remove All	Click the **Remove All** link underneath all listed addresses to remove all the addresses.

To Configure ARP Network Stack Settings

Using Web Manager

- To configure ARP protocol settings, go to the **Admin** tab/page, click **Protocol Stack** in the menu and select **ARP**.

Using the CLI

- To enter the command level: `enable -> config -> arp`

Using XML

- Include in your file: `<configgroup name="arp">`

SMTP Settings

Table 17-7 SMTP Settings

SMTP Settings	Description
Relay Address	Enter the **Relay Address** to be used to direct all outbound email messages through a mail server.
Relay Port	Enter the **Relay Port** number to be used for all outbound email messages through the mail server.

To Configure ARP Network Stack Settings

Using Web Manager

- To configure SMTP protocol settings, go to the **Admin** tab/page, click **Protocol Stack** in the menu and select **SMTP**.

Using the CLI

- To enter the command level: `enable -> config -> smtp`

Using XML

- Include in your file: `<configgroup name="smtp">`

Diagnostics

The xSenso has several tools for diagnostics and statistics. Various options allow for the configuration or viewing of IP socket information, ping, traceroute, memory, and processes.

Hardware

To View Hardware Information

Using Web Manager

- To view hardware information, go to the **Admin** tab/page, click **Diagnostics** in the menu and select **Hardware**.

Using the CLI

- To enter the command level: `enable -> device, show hardware information`

Using XML

- Include in your file: `<statusgroup name="hardware">`

IP Sockets

You can view the list of listening and connected IP sockets.

To View the List of IP Sockets

Using Web Manager

- To view IP Sockets, go to the **Admin** tab/page, click **Diagnostics** in the menu and select **IP Sockets**.

Using the CLI

- To enter the command level: `enable, show ip sockets`

Using XML

- Include in your file: `<statusgroup name="ip sockets">`

Ping

The ping command can be used to test connectivity to a remote host.

Table 17-8 Ping Settings

Diagnostics: Ping Settings (continued)	Description
Host	Enter the IP address or host name for the to ping.
Count	Enter the number of ping packets should attempt to send to the **Host**. The default is **5**.
Timeout	Enter the time, in seconds, for the to wait for a response from the host before timing out. The default is **5** seconds.

To Ping a Remote Host

Using Web Manager

- To ping a Remote Host, go to the **Admin** tab/page, click **Diagnostics** in the menu and select **Ping**.

Using the CLI

- To enter the command level: `enable`

Using XML

- Not applicable.

Traceroute

Here you can trace a packet from the xSenso to an Internet host, showing how many hops the packet requires to reach the host and how long each hop takes. If you visit a web site whose pages appear slowly, you can use traceroute to determine where the longest delays are occurring.

Table 17-9 Traceroute Settings

Diagnostics: Traceroute Settings	Description
Host	Enter the IP address or DNS hostname. This address is used to show the path between it and the xSenso when issuing the traceroute command.
Protocol	Specify the traceroute protocol.

To Perform a Traceroute

Using Web Manager

- To perform a Traceroute, go to the **Admin** tab/page, click **Diagnostics** in the menu and select **Traceroute**.

Using the CLI

- To enter the command level: `enable`

Using XML

- Not applicable.

Log

Table 17-10 Log Settings

Diagnostics: Log	Description
Output	Select a diagnostic log output type: ◆ **Disable** - Turn off the login feature. ◆ **Filesystem** - Directs logging to /log.txt.
Max Length	Set the maximum length of the log.txt file. ***Note:*** *This setting becomes available when Filesystem is selected.*

To Configure the Diagnostic Log Output

Using Web Manager

- To configure the Diagnostic Log output, go to the **Admin** tab/page, click **Diagnostics** in the menu and select **Log**.

Using the CLI

- To enter the command level: `enable -> config -> diagnostics -> log`

Using XML

- Include in your file:

  ```
  <configgroup name="diagnostics">
  ```

  and

  ```
  <configitem name="log">
  ```

Memory

The memory information shows the total, used, and available memory (in kilobytes).

To View Memory Usage

Using Web Manager

- To view memory information, go to the **Admin** tab/page, click **Diagnostics** in the menu and select **Memory**.

Using the CLI

- To enter the command level: `enable -> device, show memory`

Using XML

- Include in your file: `<statusgroup name="memory">`

Processes

The xSenso Processes information shows all the processes currently running on the system. It shows the Process ID (PID), Parent Process ID (PPID), user, CPU percentage, percentage of total CPU cycles, and process command line information.

To View Process Information

Using Web Manager

- To view process information, go to the **Admin** tab/page, click **Diagnostics** in the menu and select **Processes**.

Using the CLI

- To enter the command level: `enable, show processes`

Using XML

- Include in your file: `<statusgroup name="processes">`

Threads

The xSenso Threads information shows details of threads in the ltrx_evo task which can be useful for technical experts in debugging.

To View Thread Information

Using Web Manager

- To view thread information, go to the **Admin** tab/page, click **Diagnostics** in the menu and select **Threads**.

Using the CLI

- To enter the command level: `enable -> device, show task state`

Clock

The current date or time configured in xSenso can be viewed and modified. There are two ways to change the time: manually entering the date and time or synchronizing it with the NTP server.

Table 17-11 Clock Settings

Clock	Description
Synchronize with Server: SNTP Client	Enable or disable synchronization of the device clock settings with the NTP Server: ◆ **Enabled**: enables the SNTP Client to synchronize the device with the NTP Server. Once enabled, the **NTP Server** field appears with the default `0.pool.ntp.org` address as well as the options for manually setting date and time. Click **Submit**. ◆ **Disabled:** allows you to set the date and time manually.
Set Date and Time	Click the **Set Date and Time** checkbox to make the **Date** and **Time** settings fields available for configuration. ***Note:*** *The **Set Date and Time** checkbox is available only if you disable **Syncronize with Server** above.*
Date	Select the current **Year**, **Month** and **Day** from the drop-down menus. ***Note:*** *The **Date** configuration field is only available if you disable **Syncronize with Server** and then check the **Set Date and Time** field above.*
Time (24 hour)	Select the current **Hour**, **Min** (Minute) and **Sec** (Second) from the drop-down menus. ***Note:*** *The **Time** configuration field is only available if you disable **Syncronize with Server** and then check the **Set Date and Time** field above.*
Time Zone: Directory	Select a **Time Zone** so your device will have a reference in coordinated universal time (UTC).

To Configure the Clock

Using Web Manager

- To view configure clock information, go to the **Admin** tab/page and click **Clock** in the menu.

Using the CLI

- To enter the command level: `enable -> config -> clock`

Using the XML

- Include in your file: `<configgroup name="clock">`

System Settings

The xSenso System settings allow for rebooting the device, restoring factory defaults, uploading new firmware and updating a system's short and long name.

Note: *Anytime you reboot the unit, this operation will take some time to complete. Please wait a minimum of 10-20 seconds after rebooting the unit before attempting to make any subsequent connections.*

Table 17-12 System Settings

System Settings	Description
Reboot Device	Reboots the device.
Restore Factory Defaults	Restores the device to the original factory settings. All configuration will be lost. The xSenso automatically reboots upon setting back to the defaults. *You may also reboot your xSenso with or without restoring the settings to factory default through the Reset Button on the device.*
Upload New Firmware	Write the new firmware file to firmware.rom on the xSenso. The device automatically reboots upon the installation of new firmware. See the section, *FTP Settings on page 78*.
Short Name	Enter a short name for the system name. A maximum of 32 characters are allowed.
Long Name	Enter a long name for the system name. A maximum of 64 characters are allowed.

To Reboot or Restore Factory Defaults

Using Web Manager

- To access the area with options to reboot, restore to factory defaults, upload new firmware, update the system name (long or short names) or to view the current configuration, go to the **Admin** tab/page, click **System** in the menu.

Using the CLI

- To enter the command level: `enable`

Using XML

- Include in your file: `<configgroup name="xml import control">`

Discovery and Query Port

The current statistics and configuration options for device discovery, including Query Port are available for the xSenso.

Table 17-13 Discovery Settings

Discovery	Description
Query Port Server State	Select to enable or disable the query port server from responding to autodiscovery messages on port 0x77FE.
UPnP Server State	Select to enable or disable the UPnP server from discovering devices in Windows network places.
UPnP Server Port	Update the UPnP server port. Leaving this field blank will restore the default settings.

To Configure Discovery

Note: *If you are utilizing Windows XP, make sure to select **UPnP User Interface** under **Windows Components > Networking Services > Details** before setting up the xSenso device to utilize Discovery.*

Using Web Manager

- To access the area with options to configure discovery, go to the **Admin** tab/page and click **Discovery** in the menu.

Using the CLI

- To enter the command level: `enable -> config -> discovery`

Using XML

- Include in your file: `<configgroup name="discovery">`

18: Advanced Settings

Email Settings

View and configure email alerts relating to events occurring within the system.

Table 18-1 **Email Configuration**

Email – Configuration Settings	Description
Configure SMTP	Click this link to set *SMTP Settings* on a separate Web Manager page.
To	Enter the email address to which the email alerts will be sent. Multiple addresses are separated by semicolon (;). Required field if an email is to be sent.
CC	Enter the email address to which the email alerts will be copied. Multiple addresses are separated by semicolon (;).
From	Enter the email address to list in the From field of the email alert. Required field if an email is to be sent.
Reply-To	Enter the email address to list in the Reply-To field of the email alert.
Subject	Enter the subject for the email alert.
Message File	Enter the path of the file to send with the email alert. This file appears within the message body of the email.
Overriding Domain	Enter the **Overriding Domain** to be used to forge the sender domain name in the outgoing email message.
Server Port	Enter the **Server Port** number for emails.
Local Port	Enter the **Local Port** number for emails.
Priority	Select the priority level for the email alert: ◆ Urgent ◆ High ◆ Normal ◆ Low ◆ Very Low

To View, Configure and Send Email

Note: *The following section describes the steps to view and configure Email 1 settings; these steps apply to other emails available for the device.*

Using Web Manager

- To view Email statistics, go to the **Setup** tab/page, click **Email** in the menu and select **Email 1 -> Statistics**.
- To configure basic Email settings, go to the **Admin** tab/page, click **Email** in the menu and select **Email 1 -> Configuration**.
- To send an email, go to the **Admin** tab/page, click **Email** in the menu and select **Email 1 -> Send Email**.

Using the CLI

- To enter Email command level: `enable -> email 1`

Using XML

- Include in your file: `<configgroup name="email" instance="1">`

Command Line Interface Settings

The Command Line Interface settings allow you to control how users connect to and interact with the xSenso's command line. It is possible to configure access via the Telnet and SSH protocols, in addition to general CLI options.

Basic CLI Settings

The basic CLI settings control general CLI access and usability options.

Table 18-2 CLI Configuration Settings

Command Line Interface Configuration Settings	Description
Login Password	Enter the password for logins by the admin account. The default password is "PASS".
Enable Level Password	Enter the password for access to the Command Mode Enable level. There is no password by default.
Quit Connect Line	Enter the **Quit Connect Line** string to be used to terminate a telnet or SSH session and resume the CLI. Type <control> before the key to be pressed while holding down the **[Ctrl]** key (example: **<control>L**)
Inactivity Timeout	Set a time period in which the CLI session should disconnect if no data is received. Enter 0 to disable. Blank the display field to restore the default.
Line Authentication	**Enable** or **Disable** authentication for CLI access on the USB Serial Gadget Port.

To View and Configure Basic CLI Settings

Using Web Manager

- To view CLI statistics, go to the **Admin** tab/page, click **CLI** in the menu and select **Statistics**.
- To configure basic CLI settings, go to the **Admin** tab/page, click **CLI** in the menu and select **Configuration**.

Using the CLI

- To enter CLI command level: `enable -> config -> cli`

Using XML

- Include in your file: `<configgroup name="cli">`

Telnet Settings

The telnet settings control CLI access to the xSenso over the Telnet protocol.

Table 18-3 Telnet Settings

Telnet Settings	Description
Telnet State	**Enable** or **Disable** CLI access via telnet
Telnet Port	Enter an alternative Telnet Port to override the default used by the CLI server. Blank the field to restore the default.
Telnet Max Sessions	Specify the maximum number of concurrent Telnet sessions that will be allowed.
Telnet Authentication	**Enable** or **Disable** authentication for telnet logins.

To Configure Telnet Settings

Using Web Manager

- To configure Telnet settings, go to the **Admin** tab/page, click **CLI** in the menu and select **Configuration**.

Using the CLI

- To enter the Telnet command level: `enable -> config -> cli -> telnet`

Using XML

- Include in your file:

  `<configgroup name="telnet">`

  and

  `<configitem name="state">`

  and

  `<configitem name="authentication">`

SSH Settings

The SSH settings control CLI access to the xSenso over the SSH protocol.

Table 18-4 SSH Settings

SSH Settings	Description
SSH State	Select to **Enable** or **Disable** CLI access via telnet.
SSH Port	Specify the SSH Port and override the default, as needed. Blank the field to restore the default.
SSH Max Sessions	Specify the maximum number of concurrent SSH sessions that will be allowed.

To Configure SSH Settings

Using Web Manager

- To configure SSH settings, go to the **Admin** tab/page, click **CLI** in the menu and select **Configuration**.

Using the CLI

- To enter the SSH command level: `enable -> config -> cli -> ssh`

Using XML

- Include in your file:

  ```
  <configgroup name="ssh">
  ```

  and

  ```
  <configitem name="state">
  ```

XML Settings

The xSenso allows for the configuration of units using an XML configuration record (XCR). Export a current configuration for use on other xSenso or import a saved configuration file.

XML: Export Configuration

You can export the current system configuration in XML format. The generated XML file can be imported later to restore a configuration. It can also be modified and imported to update the configuration on this xSenso unit or another. The XML data can be dumped to the screen or exported to a file on the file system.

By default, all groups are exported. You may also select a subset of groups to export.

Table 18-5 XML Exporting Configuration

XML Export Configuration Settings	Description
Export to browser	Select this option to export the XCR data in the selected fields to the browser. Use the "xcr dump" command to export the data to the browser.
Export to local file	Select this option to export the XCR data to a file on the device. If you select this option, enter a file name for the XML configuration record. Use the "xcr export" command to export the data to a local file.
Export secrets	Select to export secret password and key information. Use only with a secure link, and save only in secure locations. ***Note:*** *Only use with extreme caution.*
Comments	Select this option to include descriptive comments in the XML.
Channels to Export	Select instances to be exported in the analog, relay and tunnel groups.

XML Export Configuration Settings (continued)	Description
Groups to Export	Check the configuration groups that are to be exported to the XML configuration record. The group list should be comma delimited and encased in double quotes. The list of available groups can be viewed with the “xcr list” command.

To Export Configuration in XML Format

Using Web Manager

- To export configuration format, go to the **Admin** tab/page, click **XML** in the menu and select **Export Configuration**.

Using the CLI

- To enter the XML command level: `enable -> xml`

Using XML

- Not applicable.

XML: Export Status

You can export the current status in XML format. By default, all groups are exported. You may also select a subset of groups to export.

Table 18-6 Exporting Status

XML Export Status Settings	Description
Export to browser	Select this option to export the XCR data in the selected fields to the browser. Use the “xcr dump” command to export the data to the browser.
Export to local file	Select this option to export the XCR data to a file on the device. If you select this option, enter a file name for the XML configuration record. Use the “xcr export” command to export the data to a local file.
Channels to Export	Select instances to be exported in the analog, relay and tunnel groups.
Groups to Export	Check the configuration groups that are to be exported to the XML configuration record. The group list should be comma delimited and encased in double quotes. The list of available groups can be viewed with the “xcr list” command.

To Export in XML Format

Using Web Manager

- To export configuration format, go to the **Admin** tab/page, click **XML** in the menu and select **Export Status**.

Using the CLI

- To enter the XML command level: `enable -> xml`

Using XML

- Not applicable.

XML: Import Configuration

Here you can import a system configuration from an XML file.

The XML data can be imported from a file on the file system or pasted into a CLI session. The groups to import can be specified at the command line, the default is all groups.

Import Configuration from External File

This import option requires entering the path and file name of the external XCR file you want to import.

Import Configuration from the Filesystem

This import option picks up settings from a file and your import selections of groups, lines, and instances. The list of files can be viewed from the filesystem level of the CLI.

Table 18-7 Import Configuration from Filesystem Settings

Import Configuration from Filesystem Settings	Description
Filename	Enter the name of the file on the (local to its filesystem) that contains XCR data.
Channels to Import	Select filter instances to be imported in the analog, relay and tunnel groups. This affects both Whole Groups to Import and Text List selections.
Whole Groups to Import	Select the configuration groups to import from the XML configuration record. This option imports all instances of each selected group.
Text List	Enter the string to import specific instances of a group. The textual format of this string is: `<g>:<i>;<g>:<i>;...` Each group name <g> is followed by a colon and the instance value <i> and each <g>:<i> value is separated by a semi-colon. If a group has no instance then only the group name <g> should be specified.

To Import Configuration in XML Format

Using Web Manager

- To import configuration, go to the **Admin** tab/page, click **XML** in the menu and select **Import Configuration**.

Using the CLI

- To enter the XML command level: `enable -> xml`

Using XML

- Not applicable.

19: Security in Detail

Public Key Infrastructure

Public key infrastructure (PKI) is based on an encryption technique that uses two keys: a public key and private key. Public keys can be used to encrypt messages which can only be decrypted using the private key. This technique is referred to as asymmetric encryption, as opposed to symmetric encryption, in which a single secret key is used by both parties.

TLS (SSL)

Transport Layer Security (TLS) and its predecessor, Secure Sockets Layer (SSL), use asymmetric encryption for authentication. In some scenarios, only a server needs to be authenticated, in others both client and server authenticate each other. Once authentication is established, clients and servers use asymmetric encryption to exchange a secret key. Communication then proceeds with symmetric encryption, using this key.

SSH and some wireless authentication methods on the xSenso make use of SSL. The xSenso supports SSLv2, SSlv3, and TLS1.0.

TLS/SSL application hosts use separate digital certificates as a basis for authentication in both directions: to prove their own identity to the other party, and to verify the identity of the other party. In proving its own authenticity, the xSenso will use its own "personal" certificate. In verifying the authenticity of the other party, the xSenso will use a "trusted authority" certificate.

In short:

- When using EAP-TLS, the xSenso needs a personal certificate with matching private key to identify itself and sign its messages.
- When using EAP-TLS, EAP-TTLS or PEAP, the xSenso needs the authority certificate(s) that can authenticate those it wishes to communicate with.

Digital Certificates

The goal of a certificate is to authenticate its sender. It is analogous to a paper document that contains personal identification information and is signed by an authority, for example a notary or government agency. With digital certificates, a cryptographic key is used to create a unique digital signature.

Trusted Authorities

A private key is used by a trusted certificate authority (CA) to create a unique digital signature. Along with this private key is a certificate of authority, containing a matching public key that can be used to verify the authority's signature but not re-create it.

A chain of signed certificates, anchored by a root CA, can be used to establish a sender's authenticity. Each link in the chain is certified by a signed certificate from the previous link, with the exception of the root CA. This way, trust is transferred along the chain, from the root CA

through any number of intermediate authorities, ultimately to the agent that needs to prove its authenticity.

Obtaining Certificates

Signed certificates are typically obtained from well-known CAs, such as VeriSign. This is done by submitting a certificate request for a CA, typically for a fee. The CA will sign the certificate request, producing a certificate/key combo: the certificate contains the identity of the owner and the public key, and the private key is available separately for use by the owner.

As an alternative to acquiring a signed certificate from a CA, you can act as your own CA and create self-signed certificates. This is often done for testing scenarios, and sometimes for closed environments where the expense of a CA-signed root certificate is not necessary.

Self-Signed Certificates

A few utilities exist to generate self-signed certificates or sign certificate requests. The xSenso also has the ability to generate its own self-signed certificate/key combo. You can use XML to export the certificate in PEM format, but you cannot export the key. Hence the internal certificate generator can only be used for certificates that are to identify that particular xSenso.

Certificate Formats

Certificates and private keys can be stored in several file formats. Best known are PKCS12, DER and PEM. Certificate and key can be in the same file or in separate files. Additionally, the key can be either be encrypted with a password or left in the clear. However, the xSenso currently only accepts separate PEM files, with the key unencrypted.

Several utilities exist to convert between the formats.

OpenSSL

OpenSSL is a widely used open source set of SSL related command line utilities. It can act as server or client. It can also generate or sign certificate requests, and can convert from and to several different of formats.

OpenSSL is available in binary form for Linux and Windows.

To generate a self-signed RSA certificate/key combo:

```
openssl req -x509 -nodes -days 365 -newkey rsa:1024 -keyout mp_key.pem -
out mp_cert.pem
```

See www.openssl.org or www.madboa.com/geek/openssl for more information.

Note: *Signing other certificate requests is also possible with OpenSSL but the details of this process are outside the scope of this document.*

Steel Belted RADIUS

Steel Belted RADIUS is a commercial RADIUS server from Juniper Networks that provides a GUI administration interface. It also provides a certificate request and self-signed certificate generator.

The self-signed certificate has extension `.sbrpvk` and is in the PKCS12 format. OpenSSL can convert this into a PEM format certificate and key:

```
openssl pkcs12 -in sbr_certkey.sbrpvk -nodes -out sbr_certkey.pem
```

The `sbr_certkey.pem` file contains both certificate and key. If loading the SBR certificate into xSenso as an authority, you will need to edit it:

1. Open the file in any plain text editor.
2. Delete all info before `"----- BEGIN CERTIFICATE-----"` and after `"----- END CERTIFICATE-----"`, and then save as `sbr_cert.pem`.

SBR accepts trusted-root certificates in the DER format. Again, OpenSSL can convert any format into DER:

```
openssl x509 -inform pem -in mp_cert.pem -outform der -out mp_cert.der
```

Note: *With SBR, when the identity information includes special characters such as dashes and periods, SBR changes the format it uses to store these strings and becomes incompatible with the current xSenso release. Support may be added for this and other formats in future releases.*

Free RADIUS

Free RADIUS is another versatile Linux open-source RADIUS server.

20: Updating Firmware

Obtaining Firmware

Obtain the most up-to-date firmware and release notes for the unit from the Lantronix Web site (www.lantronix.com/support/downloads/) or by using anonymous FTP (ftp://ftp.lantronix.com/).

Loading New Firmware through Web Manager

Reload the firmware using the device web manager Filesystem page.

To upload new firmware:

1. Select the **Setup** tab/page and click **System** in the menu bar. The **Setup > System** page appears.

Figure 20-1 Uploading New Firmware

2. Click the **Browse** (under the **Upload New Firmware** heading) to browse to the firmware file.
3. Select the file and click **Open**.

4. Click **Upload** to install the firmware on the xSenso.
5. Click **OK** in the confirmation popup which appears. The firmware will be installed and the device will automatically reboot afterwards.
6. Close and reopen the web manager internet browser to view the device's updated web pages.

Note: *Alternatively, firmware may be updated by sending the file to the xSenso over a FTP or TFTP connection. You may need to increase HTTP Max Bytes in some cases where the browser is sending data aggressively within TCP windows size limit when file (including firmware upgrade) is uploaded from webpage.*

Loading New Firmware through FTP

Firmware may be updated by sending the file to the xSenso over an FTP connection. The destination file name on the xSenso must be "firmware.rom". The device will reboot upon successful completion of the firmware upgrade.

Example FTP session:

```
$ ftp 192.168.10.127
Connected to 192.168.10.127.
220 (vsFTPd 2.0.7)
Name (192.168.10.127:user): admin
331 Please specify the password.
Password:
230 Login successful.
Remote system type is UNIX.
Using binary mode to transfer files.
ftp> put xSenso_7_6_0_0R10.rom
200 PORT command successful. Consider using PASV.
150 Ok to send data.
226 File receive OK.
9308164 bytes sent in 3.05 seconds (3047859 bytes/s)
ftp> quit
221 Goodbye.
```

21: Branding the xSenso

This chapter describes how to brand your xSenso by using Web Manager and Command Line Interface (CLI). It contains the following sections on customization:

- *Web Manager Customization*
- *Short and Long Name Customization*

Web Manager Customization

Customize the Web Manager's appearance by modifying index.html, style.css, and the product logo. The style (fonts, colors, and spacing) of the Web Manager is controlled with style.css. The text and graphics are controlled with index.html. The product logo is the image in top-left corner of the page and defaults to a product name image.

Note: *The recommended dimensions of the new graphic are 300px width and 50px height.*

The Web Manager files are hidden and are incorporated directly into the firmware image but may be overridden by placing the appropriate file in the appropriate directory on the xSenso file system.

Web Manager files can be retrieved and overridden with the following procedure:

1. FTP to the xSenso device.
2. Make a directory (`mkdir`) and name it `http/config` .
3. Change to the directory (`cd`) that you created in step 2 (`http/config`).
4. Save the contents of index.html and style.css by using a web browser and navigating to `http://<xSenso>/config/index.html and http://<xSenso>/config/xsenso_style.css`.
5. Modify the file as required or create a new one with the same name.
6. To customize the product logo, save the image of your choice as `xsenso_linux_os_logo.gif and xsenso.png` .
7. Put the file(s) by using `put <filename>`.
8. Type `quit`. The overriding files appear in the file system's http/config directory.
9. Restart any open browser to view the changes.
10. If you wish to go back to the default files in the firmware image, simply delete the overriding files from the file system.

Short and Long Name Customization

You can customize the short and long names in your xSenso. The names display in the CLI show command and in the System web page in the Current Configuration table. The short name is used for the show command. Both names display in the CLI Product Type field.

Table 21-1 Short and Long Name Settings

Name Settings	Description
Short Name	Enter a short name for the system name. A maximum of 32 characters are allowed.
Long Name	Enter a long name for the system name. A maximum of 64 characters are allowed.

To Customize Short or Long Names

Using Web Manager

- To access the area with options to customize the short name and the long name of the product, or to view the current configuration, click **System** in the menu.

Using the CLI

- To enter the command level: `enable`

Using XML

- Include in your file:

  ```
  <configitem name="short name">
  ```

  and

  ```
  <configitem name="long name">
  ```

Appendix A: Technical Specifications

Analog Inputs

- Channels: (2) Differential inputs (screw terminal connections)
- Resolution: 16 bits
- Sigma-Delta A/D conversion
- Input Mode: Voltage/Current
- Input Range: ±100 mV, ±1V, ±10V, ±20 mA
- Scaling: Configurable offset or scale and offset
- Alarm Triggers: Low, high, or range watermarks
- Accuracy:
  - +/-100 mV Range accuracy = +/-0.1 mV at 25°C
  - +/-1V Range accuracy = +/-1 mV at 25°C
  - +/-10V Range accuracy = +/-10 mV at 25°C
  - +/-20 mA Range accuracy = +/-0.02 mA at 25°C
- Excitation: 15 VDC, 10 mA per channel or 20 mA total
- Sampling Rate: 10 per second, per channel
- Input Impedance: Voltage 1M ohm, Current 10 ohms min
- Galvanic Isolation: 3000 VDC
- UL Rating: Class 2

Note: *To achieve a reading accuracy with low level signals, power supplies to the xSenso and target device need to be clean of switching noise, and also the safety ground (earth) may need to be connected at the Ground of Power Input terminal block to establish a low impedance noise return path.*

Analog Outputs

- Channels: 2 outputs, independently isolated, single ended
- Resolutions: 12 bits
- Output modes: Voltage/Current
- Output ranges: 0-10V, 0-20mA
- Control: Exclusive input tracking or controlled by alarm or remote command
- Alarm Triggers: Low, High or range water mark
- Accuracy:
  - 0-10V Range accuracy = +/-0.01V at 25°C (load current 10 mA max)
  - 0-20 mA Range accuracy = +/-0.02 mA at 25°C (load voltage 11.0V max)
- Galvanic Isolation: 3000 VDC

Relay Ports

- Channels: 2, independently isolated.
- Modes: Relay SPDT, NC-NO with COM
- Control: controlled by alarm or remote command

- Rated current: 3A
- Rated voltage: 250 VAC
- Contact rating on relays:
  - 30VDC 3A, 250VAC 3A, 100000 cycles (IEC 61810)
  - 30VDC 3A, 240VAC 3A, 100000 cycles (UL 508)
- Isolation between relay contacts and internal circuitry: 4000 VAC
- Isolation between relay open contacts: 1000 VAC
- UL rating: Class 2

Note: *Wires attached to the relay terminal blocks must be rated 90°C or higher! Connect Analog Inputs and Analog Outputs only to IEC Class III or NEC Class 2 Circuits. Relay Ports are to connect only to circuit rated 100-250VAC 3A, or 30VDC 3A*

Architecture

- Controller: 32-bit ARM 9 microprocessor running at 400 megahertz (MHz)
- Memory: 64 Mbit (8 Mbyte) Serial Flash, 512 Mbit (64 Mbyte) NAND Flash and 1 Gbit (128 Mbyte) DDR2 RAM
- Terminal Block Plug Wires: 26-16 AWG

Network Interface

- Interface: (1) Ethernet 10Base-T or 100Base-TX
- Auto sensing for speed, duplex, and MDIX (cross-over cable)
- Magnetic Isolation: 1500 VAC
- Protocols: TCP, Modbus TCP, UDP, ARP, ICMP, Telnet, DHCP, BOOTP, HTTP, HTTPS, HTTP/HTTPS POST, FTP/FTPS Put, DNS, SNTP, SMTP AUTH, SNMP (MIB II) v1/v2c/v3, custom MIBs, AutoIP, SSH, SSL, RSS, XML, FTP, Syslog, uPnP (device discovery)

Note: *See Protocol Support (on page 17) for updated protocols supported.*

Management

- (1) USB port
- Web Configuration (HTTP/HTTPS)
- XML
- CLI (Telnet/SSH)
- DeviceInstaller - Windows based utility for device discovery and system recovery

Security

- Username/Password Authentication
- 128, 192, 256-bit AES Encryption
- SSL, SSH

DAQ

- Server: Tunnel Accept, Modbus and SNMP (Lantronix xSenso MIB)
- Client: Action Connect mode, HTTP Post, FTP Put and SNMP Trap

Software

- Customizable real-time reading and chart view
- Analog input data can be logged on the PC from which the browser connection is made.
- Configurable Data Acquisition format for selectable network connectivity modes (TCP, UDP, SSL, SSH, TCP-AES)
- Configurable Alarms - connect tsend streaming data, send email and text message via email
- In field firmware upgrades via FTP, HTTP/HTTPS and USB Port

Power*

- (1) Terminal screw block
- (1) Barrel locking connector
- Input Voltage: 9-30 VDC
- Power Consumption
  - 3W without excitation sources, 3.5W with excitation sources (Analog Inputs only version)
  - 4W without excitation sources, 4.5W with excitation sources (Analog Inputs and Analog Outputs version)
  - 4W without excitation sources, 4.5W with excitation sources (Analog Inputs and Relay Ports version)
- This product is intended to be supplied by a listed direct plug-in power unit marked "Class 2" and rated from 9 to 30 VDC, 500 mA.

Note: *Both terminal screw block and barrel locking connector may be used simultaneously for power redundancy. The unit's power usage will be from the source with higher voltage. Also, note that this redundancy configuration does not guarantee an uninterrupted operation at the moment when one source goes out of service.*

Environmental

- Operating Temperature: -40° to +85° C
- UL certified Operating Temperature: -40°to +75°C
- Storage Temperature: -40° to +85° C
- Relative Humidity: 5 to 95% (non-condensing)

Physical Characteristics

- Dimensions for xSenso 2100: 4.8 x 3.50 x 1 in (L x W x H)
- Dimensions for xSenso 21A2 and xSenso 21R2: 5.25 x 3.50 x 1 in (L x W x H)
- Weight for xSenso 2100: .12 kg (.26 lb)]
- Weight for xSenso 21A2 and xSenso 21R2: .14 kg (.30 lb)
- Mounting: DIN rail or wall-mount

Appendix B: Technical Support

If you are unable to resolve an issue using the information in this documentation, please contact Technical Support:

Technical Support US

Check our online knowledge base or send a question to Technical Support at http://www.lantronix.com/support.

Technical Support Europe, Middle East, Africa

Phone: +33 13 930 4172
Email: eu_techsupp@lantronix.com or eu_support@lantronix.com

Firmware downloads, FAQs, and the most up-to-date documentation are available at http://www.lantronix.com/support

When you report a problem, please provide the following information:

- Your name, and your company name, address, and phone number
- Lantronix model number
- Lantronix serial number/MAC address
- Firmware version (on the first screen shown when you Telnet to the device and type show)
- Description of the problem
- Status of the unit when the problem occurred (please try to include information on user and network activity at the time of the problem)
- Additionally, it may be useful to export and submit the exported XML Configuration file.

Appendix C: Binary to Hexadecimal Conversions

Many of the unit's configuration procedures require you to assemble a series of options (represented as bits) into a complete command (represented as a byte).

The resulting binary value must be converted to a hexadecimal representation.

Use this chapter to learn to convert binary values to hexadecimals or to look up hexadecimal values in the tables of configuration options. The tables include:

- Command Mode (serial string sign-on message)
- AES Keys

Converting Binary to Hexadecimal

Following are two simple ways to convert binary numbers to hexadecimal notation.

Conversion Table

Hexadecimal digits have values ranging from 0 to F, which are represented as 0-9, A (for 10), B (for 11), etc. To convert a binary value (for example, 0100 1100) to a hexadecimal representation, treat the upper and lower four bits separately to produce a two-digit hexadecimal number (in this case, 4C). Use the following table to convert values from binary to hexadecimal.

Scientific Calculator

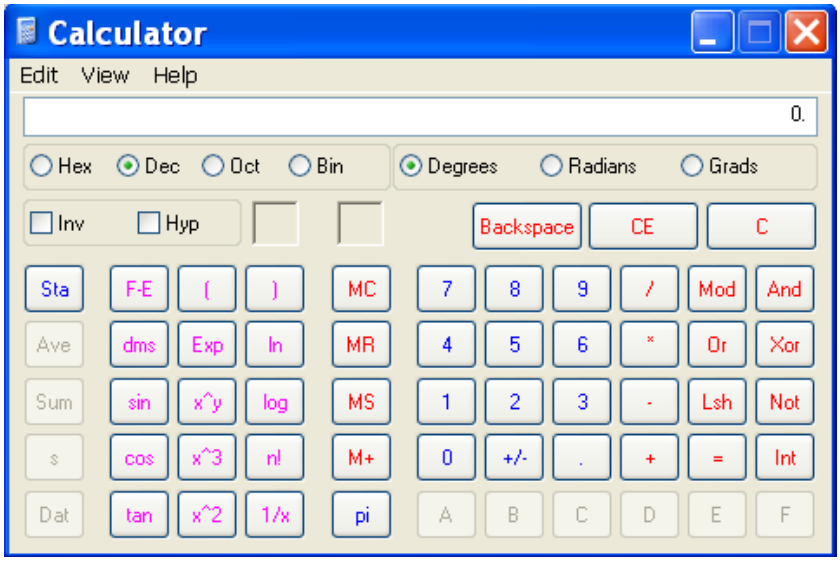
Another simple way to convert binary to hexadecimal is to use a scientific calculator, such as the one available on the Windows operating systems. For example:

1. On the Windows Start menu, click **Programs -> Accessories -> Calculator**.
2. On the View menu, select **Scientific**. The scientific calculator appears.
3. Click **Bin** (Binary), and type the number you want to convert.

Table C-1 Binary to Hexadecimal Conversion

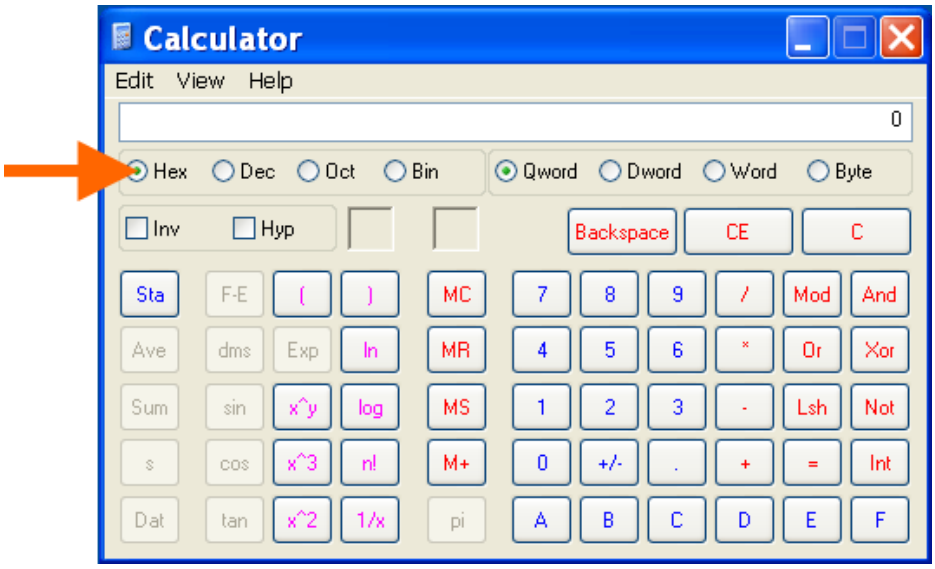
Decimal	Binary	Hex
0	0000	0
1	0001	1
2	0010	2
3	0011	3
4	0100	4
5	0101	5
6	0110	6
7	0111	7
8	1000	8
9	1001	9
10	1010	A
11	1011	B
12	1100	C
13	1101	D
14	1110	E
15	1111	F

Figure C-2 Windows Scientific Calculator



4. Click **Hex**. The hexadecimal value appears.

Figure C-3 Hexadecimal Values in the Scientific Calculator



Appendix D: Compliance

(According to ISO/IEC Guide 17050-1, 17050-2 and EN 45014)

Manufacturer's Name & Address:

Lantronix, Inc.
167 Technology Drive, Irvine, CA 92618 USA

Product Name Model:

xSenso 2100, xSenso 21A2 and xSenso 21R2

Conforms to the following standards or other normative documents:

Emissions

- FCC Part 15 Subpart B
- Industry Canada ICES-003 Issue 4 February 2004
- CISPR 11:2003 + A1:2004 + A2:2006 - Industrial, Scientific, and Medical
- VCCI V-3/2010.04
- AS/NZS CISPR 22: 2009
- EN 55011:2007 + A2:2007
- EN 61000-3-2:2006 +A1:2009 +A2:2009
- EN 61000-3-3:2008

Immunity

- EN 61326-1:2006
- EN 61000-4-2:2009
- EN 61000-4-3:2006 + A1: 2008
- EN 61000-4-4:2004 + A1: 2010
- EN 61000-4-5:2006
- EN 61000-4-6:2009
- EN 61000-4-8:2010
- EN 61000-4-11:2004

Safety

- UL 60950-1, 2nd Edition
- CAN/CSA-C22.2 No. 60950-1-07, 2nd Edition
- UL 61010-1, 3rd Edition
- UL 508, 17th Edition
- IEC 60950-1:2005, 2nd Edition with National Deviations
- Low Voltage Directive (2006/95/EC)
- VCCI
- C-TICK

Manufacturer's Contact:

Lantronix, Inc.
167 Technology Drive, Irvine, CA 92618 USA
Tel: 949-453-3990
Fax: 949-450-7249

RoHS Notice

All Lantronix products in the following families are China RoHS-compliant and free of the following hazardous substances and elements:

- Lead (Pb)
- Cadmium (Cd)
- Mercury (Hg)
- Hexavalent Chromium (Cr (VI))
- Polybrominated biphenyls (PBB)
- Polybrominated diphenyl ethers (PBDE)

Product Family Name	Toxic or hazardous Substances and Elements					
	Lead (Pb)	Mercury (Hg)	Cadmium (Cd)	Hexavalent Chromium (Cr (VI))	Polybrominated biphenyls (PBB)	Polybrominated diphenyl ethers (PBDE)
DSC	0	0	0	0	0	0
EDS	0	0	0	0	0	0
IntelliBox	0	0	0	0	0	0
MatchPort	0	0	0	0	0	0
Micro	0	0	0	0	0	0
MSS100	0	0	0	0	0	0
PremierWave	0	0	0	0	0	0
SCS	0	0	0	0	0	0
SecureBox	0	0	0	0	0	0
SLB	0	0	0	0	0	0
SLC	0	0	0	0	0	0
SLP	0	0	0	0	0	0
Spider and Spider Duo	0	0	0	0	0	0
UBox	0	0	0	0	0	0
UDS1100 and 2100	0	0	0	0	0	0
WiBox	0	0	0	0	0	0
WiPort	0	0	0	0	0	0
xDirect	0	0	0	0	0	0
xPico	0	0	0	0	0	0
XPort	0	0	0	0	0	0
XPress DR & XPress-DR+	0	0	0	0	0	0
xPrintServer	0	0	0	0	0	0
xSenso	0	0	0	0	0	0

O: toxic or hazardous substance contained in all of the homogeneous materials for this part is below the limit requirement in SJ/T11363-2006.

X: toxic or hazardous substance contained in at least one of the homogeneous materials used for this part is above the limit requirement in SJ/T11363-2006.

Appendix E: USB-CDC-ACM Device Driver File for Windows Hosts

The following file may be used to enable Windows to recognize the USB-CDC-ACM connection to the xSenso's USB Device port.

Create the linux-cdc-acm.inf file on the Windows host somewhere using the contents provided below. When Windows prompts for a device driver for the USB connection, point it to this file.

Note: *For Windows 7 installation, it is recommended to manually install the driver before plugging in the USB cable to the device port. This can be done by installing a legacy driver for a COM port, with the Have Disk... option.*

```
; Windows USB CDC ACM Setup File
; Based on INF template which was:
;     Copyright (c) 2000 Microsoft Corporation
;     Copyright (c) 2007 Microchip Technology Inc.
; likely to be covered by the MLPL as found at:
;    <http://msdn.microsoft.com/en-us/cc300389.aspx#MLPL>.
; For use only on Windows operating systems.
[Version]
Signature="$Windows NT$"
Class=Ports
ClassGuid={4D36E978-E325-11CE-BFC1-08002BE10318}
Provider=%Linux%
DriverVer=11/15/2007,5.1.2600.0
[Manufacturer]
%Linux%=DeviceList, NTamd64
[DestinationDirs]
DefaultDestDir=12
;------------------------------------------------------------------------
;  Windows 2000/XP/Vista-32bit Sections
;------------------------------------------------------------------------
[DriverInstall.nt]
include=mdmcpq.inf
CopyFiles=DriverCopyFiles.nt
AddReg=DriverInstall.nt.AddReg
[DriverCopyFiles.nt]
usbser.sys,,,0x20
[DriverInstall.nt.AddReg]
HKR,,DevLoader,,*ntkern
HKR,,NTMPDriver,,USBSER.sys
HKR,,EnumPropPages32,,"MsPorts.dll,SerialPortPropPageProvider"
[DriverInstall.nt.Services]
AddService=usbser, 0x00000002, DriverService.nt
[DriverService.nt]
DisplayName=%SERVICE%
ServiceType=1
StartType=3
ErrorControl=1
ServiceBinary=%12%\USBSER.sys
```

```
;------------------------------------------------------------------------
;  Vista-64bit Sections
;------------------------------------------------------------------------
[DriverInstall.NTamd64]
include=mdmcpq.inf
CopyFiles=DriverCopyFiles.NTamd64
AddReg=DriverInstall.NTamd64.AddReg
[DriverCopyFiles.NTamd64]
USBSER.sys,,,0x20
[DriverInstall.NTamd64.AddReg]
HKR,,DevLoader,,*ntkern
HKR,,NTMPDriver,,USBSER.sys
HKR,,EnumPropPages32,,"MsPorts.dll,SerialPortPropPageProvider"
[DriverInstall.NTamd64.Services]
AddService=usbser, 0x00000002, DriverService.NTamd64
[DriverService.NTamd64]
DisplayName=%SERVICE%
ServiceType=1
StartType=3
ErrorControl=1
ServiceBinary=%12%\USBSER.sys
;------------------------------------------------------------------------
;  Vendor and Product ID Definitions
;------------------------------------------------------------------------
; When developing your USB device, the VID and PID used in the PC side
; application program and the firmware on the microcontroller must match.
; Modify the below line to use your VID and PID.  Use the format as shown
; below.
; Note: One INF file can be used for multiple devices with different
;       VID and PIDs.  For each supported device, append
;       ",USB\VID_xxxx&PID_yyyy" to the end of the line.
;------------------------------------------------------------------------
[SourceDisksFiles]
[SourceDisksNames]
[DeviceList]
%DESCRIPTION%=DriverInstall, USB\VID_0525&PID_A4A7,
USB\VID_0525&PID_A4AB&MI_02
[DeviceList.NTamd64]
%DESCRIPTION%=DriverInstall, USB\VID_0525&PID_A4A7,
USB\VID_0525&PID_A4AB&MI_02
;------------------------------------------------------------------------
;  String Definitions
;------------------------------------------------------------------------
;Modify these strings to customize your device
;------------------------------------------------------------------------
[Strings]
Linux               = "Linux Developer Community"
DESCRIPTION         = "Gadget Serial"
SERVICE             = "USB RS-232 Emulation Driver"
```